the Army Space Journal

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A Professional Journal for Army Space Operators

Published by U.S. Army Space and Missile Defense Command

SPACE
Why the Warfighter Should Care

We want you to know
This Journal's for you

Welcome to this our second edition of what we now call the Army Space Journal. We believe this new look, name and content represent our focus on informing Space Operations Officers who serve in Functional Area 40. We want to address Space issues that affect these officers and the entire U.S. Army.

Mostly, we hope you find the Journal informative, useful and, even, educational on the topic of Space operations - not only this edition in your hand now, but in all that you'll see and read in the future.

Comments in the Commanding General's column put our focus best:

"It is important we keep in mind that Operation Enduring Freedom represents a single point along the spectrum of operations for which our military must be continually prepared to fight and win. You, as the Army's specially trained cadre of Space-smart officers, must apply what we are learning today to help build our Interim and Objective Forces as the Army marches toward its transformation."

So Space is an integral part of our Army tomorrow. Which raises the question in this quarter's theme of Space relevance: Why should the Army combat arms soldier and leader care about Space capabilities?

This, we need to explore.

Our goal is that the assembly of articles we've printed on the following pages begin to open some windows that can help us all answer the question. We know it is an evolution of knowledge. And, we know, that goes far beyond the list of articles shown on the contents page.

So our intent is to begin a dialogue that goes beyond just these pages and the walls of your office. We feel strongly that this dialogue must not only be amongst those inside the Space community, but also with those leaders you deal with daily in your world.

We want you to share the Journal with your counterparts and leaders wherever you serve. Comments and submissions to the Journal are always welcome - both from you and those you share it with.

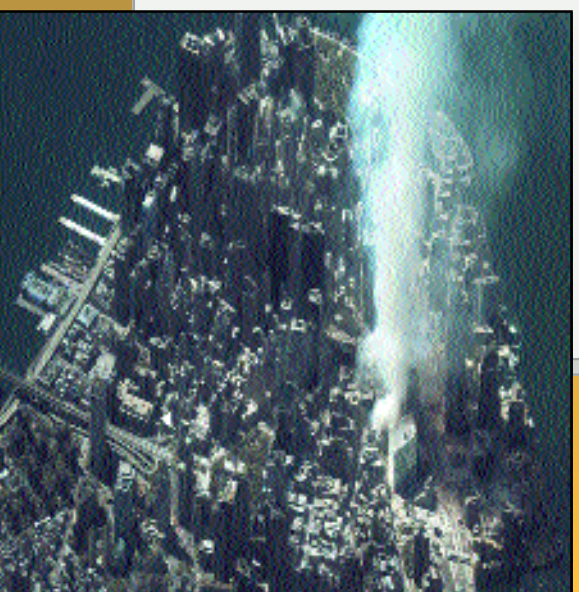
To help our effort toward dialogue, these are the upcoming themes: The Army's role in Space control, Summer 2002; Space operations: A growing industry, Fall 2002; Transformation and Space force application, Winter 2002; and The Army's future in Space, Spring 2003.

Finally, we want to thank the many writers, editors and subject matter experts who put their hearts into producing this for you. We hope you enjoy it. We hope you gain something from it. We hope you talk about it.

We want you to feel you own this publication.

We hope it is a spark.

— Managing Editor



Spectral Products include high-resolution and approach planning products for homeland defense mission planning. For more information see the Spectral Operations Resource Center's article on Page 16.

the Army Space Journal

Spring 2002 Edition

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Approval: The Commanding General, U.S. Army Space and Missile Defense Command has determined that the publication of this periodical is necessary in the transaction of the public business as required by law. Use of funds for printing this publication has been approved by the Commanding General, January 2001, in accordance with AR 25-30.

Mission: The Army Space Journal is published quarterly by the U.S. Army Space and Missile Defense Command. The journal provides a forum through which Space operations officers can disseminate professional knowledge and furnish information within the U.S. Army. The purpose is to increase the effectiveness of Space operations through a professional discussion of events and lessons learned. It is also intended to inform the Army warfighter on Army Space initiatives.

Comments, inquiries and manuscripts should be sent to the Director, Force Development and Integration Center (FDIC), ATTN:
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Distribution to Functional Area 40 officers and associated military officers, civilians, and contractors. Changes to addresses and requests for this publication should be made to the FDIC address listed above.

Space Criticality to Ongoing Military Operations

Lt. Gen. Joseph M. Cosumano, Jr., Commanding General, United States Army Space & Missile Defense Command/ United States Army Space Command.

By Lt. Gen. Joseph M. Cosumano, Jr.

Draft copies of books describing "lessons learned" from Operation Enduring Freedom are already being written. No matter what the author's take on our successes and failures, I can guarantee you each will dedicate a significant portion of his or her book to the critical role Space is playing in this worldwide war on terrorism. In this article I intend to highlight examples of the more salient force enhancement support that Space assets have provided.

Before the first soldier, sailor, airman, or Marine was placed in harm's way — and well before the first unmanned aerial vehicle was deployed — we used satellites to scan hundreds of thousands of square miles of Afghanistan's rugged terrain. This information gave us a feel for the terrain, for the weapons that potentially could be employed against us, and for an initial set of targets to be attacked with cruise missiles and high-altitude bombers. We used satellites to collect electronic and signals intelligence on the enemy. Satellites fed constant data about cloud cover and moisture into weather forecasting programs. Satellites with spectral imagers were used to detect changes in terrain features indicating potential use by the enemy. Satellites were also available to detect the infrared signature of a missile launch if the terrorists had possessed that capability. Satellites were our first "eyes on target" operating 24 hours a day, during day and night and in all weather.

As the decision neared to deploy forces into theater, digital terrain data provided by satellites were used to develop 3-D images of terrain and streets and even to give military planners an idea of the view from a terrorist's window. This proved to be a boon for pilots flying low-altitude missions through rugged mountains and for special operations forces carrying out covert raids.

The image of special operations forces soldiers riding horses alongside Northern Alliance forces belies their true capabilities. Inside their saddle packs are global positioning system (GPS) trackers, laser designators, satellite-communications gear that enables them to talk directly to pilots overhead, and laptop computers on which to download satellite imagery. They know where they are. Through the clever combination of GPS-derived position data, advanced communications, and a variety of Space and airborne sensors, they are able to give fellow soldiers and their commanders — in and outside the theater — a continuous picture of their location and movements. This is commonly referred to as Blue Force Tracking.

These force enhancement capabilities enable our special operations soldiers to accurately identify the locations of targets from a safe distance, relay the target coordinates via satellite phones or laptop computers to warplanes circling overhead, and then get back on their horses to ride to the next target.

We are seeing the employment of precision-guided munitions to a much greater degree than ever before. Estimates show that more than 70 percent of the ordnance dropped so far was precision guided. In contrast, the comparable figures were 30 percent in Kosovo and 10 percent in the Gulf War a decade ago. Our GPS satellites enable pinpoint locating of enemy targets. Our communication satellites relay targeting data to the appropriate command centers that then decide which targets to assign to which bomber. The pilots load this targeting information into their satellite-guided munitions — joint direct attack munitions (JDAMs) are the workhorse so far. These munitions are 2,000-pound bombs fitted with satellite-guidance systems and navigational fins making the ordnance smart enough to hit within a few yards of the target. If, while airborne, the targets change, new targeting information is sent via satellite links directly to the pilots who download this new information into their bombs. The pilots, upon reaching the area of operations, then unleash their payload and the JDAMs fall from the sky as if riding on a string to their targets.

In 1944, it took 835 B-29 flights to achieve four percent damage of a Japanese aircraft-engine plant. Today, a single bomber with satellite-guided bombs can shut down the plant. This precision bombing, capable of keeping up with moving forces, enabled U.S. firepower to clear the way for

As war and intelligence operations become more sophisticated, we find ourselves relying more heavily on Space-relay links from the Pentagon to military command centers in Europe and the Middle East and, further, to outposts near the front lines of operation.

the Northern Alliance as it turned the tables on its old nemesis, the Taliban. It has become possible for B-52s circling thousands of feet above the battlefield to provide close air support.

The emergence of U.S. commercial surveillance satellite systems — such as Space Imaging's Ikonos satellite and Digital Globe's Quickbird satellite launched on October 18, 2001, and only halfway through its verification and calibration period — has added a new wrinkle to our goal of achieving Space control, assuring our access to required Space assets while limiting or precluding similar access by our adversaries.

Previously, we relied on the French Satellite Probatoire d'Observation de la Terre, National Aeronautics and Space Administration's Land Remote-Sensing Satellite, and our own classified systems to provide electro-optical imagery. Because we closely guarded the secrecy of the imagery provided by our classified sources, fewer commanders benefited due to restricted data distribution. Today, commercial ventures are making operationally relevant electro-optical imagery available to everyone – but for a fee. As part of our ongoing Space control efforts, the National Imagery and Mapping Agency signed an exclusive deal that allowed the Department of Defense to control all of Ikonos' high quality images of Afghanistan.

I am sure we will consider availing ourselves of Quickbird's services once it commences full operations later this year. Not only does this process keep the imagery away from our adversaries, it also enables us to supplement our capabilities so that by training commercial satellites on lower-priority targets we can free up government satellites for higher priority shots — all from bases hundreds of miles away. It also enables us to use unclassified commercial images in public or in semi-privacy — say, when we share information with coalition partners — without having to reveal the capabilities of our advanced imaging systems. Other Space control efforts that have so far been employed include beefing up the security around all our ground stations and the deployment of 1st Space Battalion's Space and Electronic Warfare Detachment.

The constellation of sensors that is almost constantly aloft over Afghanistan – from Boeing 707s carrying ground-target radars, to unmanned Predators and Global Hawks with long-range camera lens, to reconnaissance satellites high above the Earth – have provided a sharper, more continuous picture of the battlefield than any commander has ever had. We don't miss anything if we have an eyeball on it all the time.

Satellites are also enabling us to better manage the propaganda "war." When the Taliban and Al Qaeda claim massive collateral damage from our attacks, we can rapidly produce satellite imagery to disprove their claims. We can also, if we so choose, impede their ability to effectively use satellites for broadcasting television and radio messages. By so doing, we can stop them from rallying their forces and world opinion against us.

As war and intelligence operations become more sophisticated, we find ourselves relying more heavily upon Space-relay links from the Pentagon to military command centers in Europe and the Middle East and, further, to outposts near the front lines of operation. The Commander in Chief (CINC) no longer has to be in the theater of operations, as evidenced by the ability of Gen. Tommy R. Franks, CINC Central Command, to run the war from his headquarters in Tampa, Florida.

The conduct of joint operations is no longer limited to the traditional dimensions of land, sea and air. Space now extends the boundaries, adds a new dimension, and enhances warfighting capabilities — as evidenced by the examples provided above.

In closing, it is important we keep in mind that Operation Enduring Freedom represents a single point along the spectrum of operations for which our military must be continually prepared to fight and win. You, as the Army's specially trained cadre of Space-smart officers, must apply what we are learning today to help build our Interim and Objective Forces as the Army marches toward its transformation. We must prepare across the entire spectrum of possible future operations because, perhaps, the biggest lesson we have learned is — it is impossible to know with certainty when and where new challenges will arise.

Secure the High Ground!

Army Space and Missile Defense:

Global Perspective & Experience for a Global War

Brig. Gen. Richard V. Geraci, Deputy Commanding General for Operations, United States Army Space & Missile Defense Command/Deputy Command General, United States Army Space Command.

By Brig. Gen. Richard V. Geraci

From the beginning, U.S. Army Space and Missile Defense Command (SMDC) and Army Space Command soldiers and civilians have been fully engaged in a myriad of actions supporting Operations Noble Eagle and Enduring Freedom. SMDC has deployed soldiers, civilians, and contractors worldwide and has brought a global perspective and experience to the global fight. Our Army Space and Missile Defense team has provided Army Space Support Teams with new operational capabilities, provided Space-based images of numerous regions of the world, created 3-D fly-throughs for pilots, tracked force movements across remote regions of the world, planned for the Homeland Defense, and more. While the specifics on much of what we have done are classified, some of our activities since September 11 can be addressed in a general manner.

The Army Space Operations Center (ARSPOC) in Colorado Springs is providing reach-back Space and communications support around the clock. All taskings and mission directives from the Commander-in-Chief, U.S. Space Command (CINCSPACE) are handled here. In addition to providing the command and control and operational status of Army Space forces, the ARSPOC pushes information forward to Space operations officers worldwide supporting our warfighters. It provides a reach-back one-stop-shop for Space operations officers when they need information and support. The ARSPOC has provided 24/7 support to CINCSPACE, the Army, and Space officers around the globe.

The Command provided and continues to provide spectral information and services to strategic-level commanders to use in their decision-making processes. Their requests for support started flowing into our Spectral Operations Resource Center (SORC) beginning September 11. Several great articles about this are in this issue of the journal.

The SMDC Battle Lab in conjunction with the SORC developed the satellite multi-spectral imagery mapping that the resource center has used to provide various terrestrial images to commanders. That technology was also used to produce the 3-D fly-throughs.

The SMDC Battle Lab provided a "future operational capability" to the Air Force to enhance command and control on situational awareness. The Battle Lab was the only organization that had it and the Air Force needed it. No hint of Service rivalry, Service infighting, or budget concerns got in the way of providing commanders with what they needed to accomplish their missions. As a result, this "future operational capability" was used during an actual operation, an unprecedented way to do research, development, and fielding business. This led the directors of the Battle Lab and the Force Development and Integration Center to distribute to the Army staff a "Capabilities Catalog" describing all the Army Space systems available to commanders.

We completed standing up the Space-Based Blue Force Tracking Mission Management Center (MMC) in conjunction with U.S. Space Command's J3. (We are the lead service component for Blue Force Tracking.) The center keeps track of U.S. - designated forces and equipment in remote regions of the world and feeds accurate and timely information into the commanders' common operating pictures. The Mission Management Center operates 24 hours a day, seven days a week. Support from the 193d Space Support Battalion, Colorado Army National Guard, has been instrumental in manning and operating the MMC. National Guard soldiers volunteering for this duty, were screened for their operational

Our role across the full spectrum of military operations has been clearly recognized. We have been called upon like never before to provide services, products, and expertise at the strategic, as well as, operational and tactical levels.

expertise and security clearances, mobilized, trained, and certified.

The Army Space Program Office (ASPO) began fielding the Grenadier BRAT (Beyond-line-of-sight Reporting and Tracking) in October 2001. This system works in conjunction with Space-based Blue Force Tracking to give commanders the ability to track friendly forces in near-real time.

While the Grenadier BRAT is a new system, ASPO's Tactical Exploitation of National Capabilities Program (TENCAP) is in its 29th year and still fulfilling the warfighter's needs. The Space Program Office developed TENCAP systems, with their ability to receive and process data from a robust suite of national, theater, and tactical sensor systems, to form an integral part of the Department of Defense intelligence architecture. ASPO has leveraged the national technology to downlink national strategic systems to tactical levels. This data provides commanders and tactical units with timely targeting, battle planning, and battle damage assessment information, and with an accurate and current picture of the enemy and terrain during planning and execution. National data combined with data from other sources significantly enhances the Intelligence Preparation of the Battlefield. TENCAP secondary dissemination and intelligence broadcast capabilities provide continuing awareness through all phases of operations. They provide the tactical commander the ability to see, hear and target deep, and then assess the impact of shooting deep.

Army Space Command has addressed new responsibilities in support of U.S. Space Command efforts to better plan for, synchronize, integrate, and coordinate Space and information operations support to the combatant CINCs. In order to enhance support, U.S. Space Command established a Space and Information Operations Element. U.S. Space Command tasked Army Space Command and its other service components to support the forward deployed and reach-back Space and information elements. Army Space Command met itscomponent responsibility by providing Army Space and information operations planning expertise. The Army's Land Information Warfare Activity and their Field Support Teams also provided critical Army expertise in support of this effort.

Our Regional Satellite Communications Support Centers provided planning and management of Department of Defense communications satellites. They optimized scarce communications resources for the CINCs and their components. They configured and/or reconfigured numerous communications networks to support each phase of the operation. These networks provide critical command and control connections forward to deployed forces as well as back to the United States.

The 1st Satellite Control Battalion which performs payload and network control of the Defense Satellite Communications System saw a doubling of the missions they were supporting after September 11. The battalion not only provides support to the Secretary of Defense, Joint Staff, military services, and a number of different agencies including the intelligence community, but they also provide critical telephonic and internet communications for forward deployed forces.

Just as important to our Space mission is the effort to integrate air and missile defense. The command has traditionally supported the North American Aerospace Defense Command (NORAD) with a cell specifically designed to plan for Ground-based Midcourse Defense,

(See DCG, page 34)

The View From (Army) Space …

"What's the Army doing in Space?"

By Col. Glen C. Collins, Jr.

"The Army is developing high-quality professional Space officers to work in the joint Space force, fielding a family of ground-based Space control negation and surveillance systems, and integrating Space into terrestrial operations." If someone asks you, "What is the Army doing in Space?" that should be your answer.

This edition of the *Army Space Journal* addresses this last item of integration of Space into terrestrial operations.

The Army Space Command is the primary conductor of Space operations. We in the Force Development and Integration Center (FDIC) and your Functional Area 40 (FA 40) proponent office, the Space and Missile Defense Battle Lab (SMDBL), the Space and Missile Defense Technology Center (SMDTC), and the Army Space Program Office (ASPO) are your schoolhouse and "TRADOC-like" support.

Collectively, we represent "Fort Space" whose geographical center is in Colorado Springs, but of course is distributed also in the Washington, D.C. area and Huntsville, Ala.

We are making good progress in several areas in support of Space operations. Doctrine is being written for a revised Army Space operations manual — to be renumbered as FM 3-14 — with accompanying manuals for Army Space Support Team operations, Joint Tactical Ground Stations/multimission mobile processor, and Space control operations. We are working with Air Force Space Command (AFSPC) on Space-based infrared system (SBIRS) and the Space-based radar (SBR). In both cases, the Army is focused on the user ground segment and will model its work in SBR on the SBIRS program.

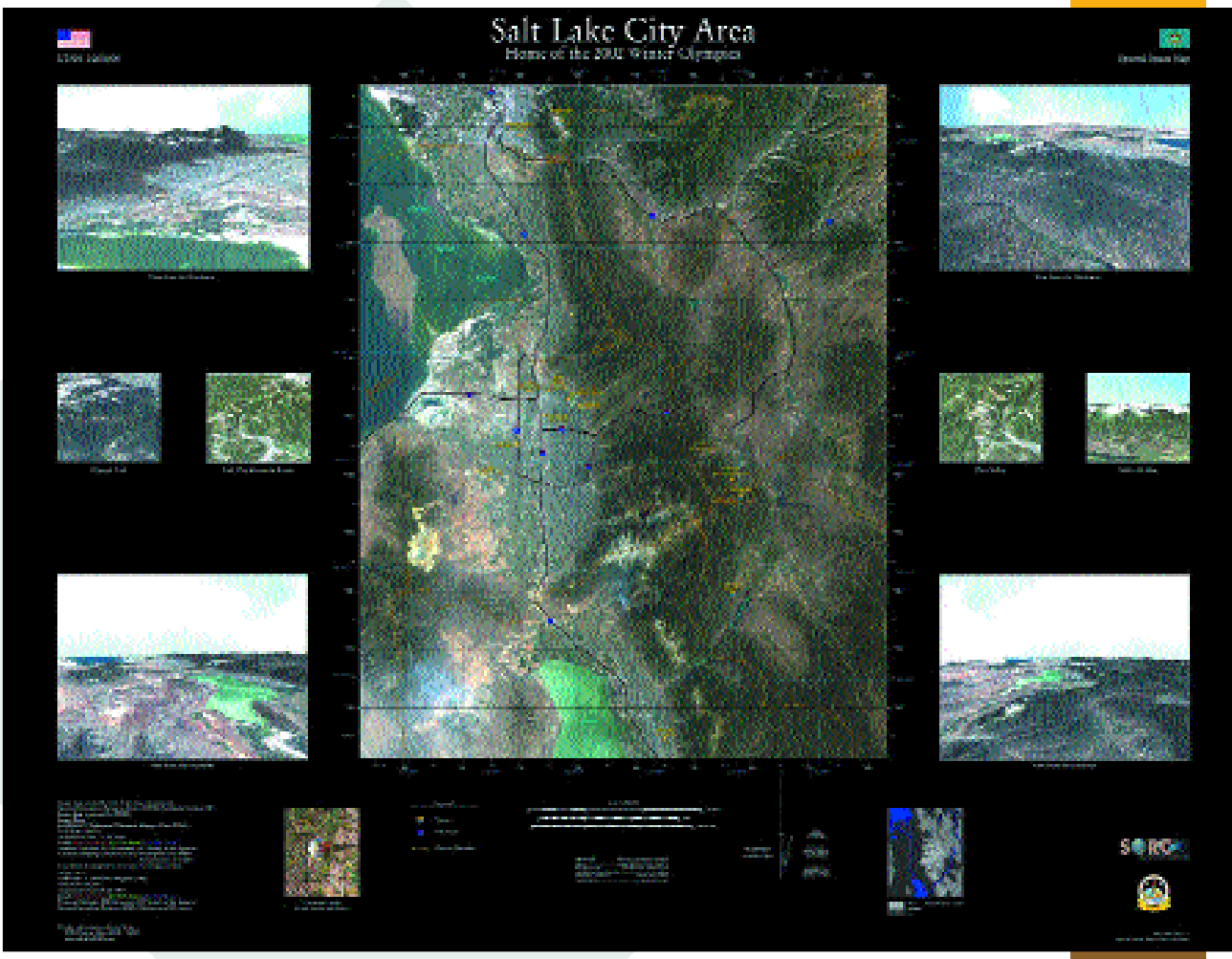
We are also working with the Army information and signal community to rapidly develop and deploy a Blue Force Tracking system that will support today's global war on terrorism and point us toward the Objective Force. ASPO has already fielded Grenadier Beyond line-of-sight Reporting and Tracking (BRAT); both SMDBL and SMDTC have programs that will provide both freindly force tracking and communications and situational awareness to the dismounted soldier or platform.

We are also working with the National Security Space Architect to transform the satellite communications fleets to meet the needs of the services as we transform to a 21st century force. Both Army Space Command and FDIC are working improvements in the use of commercial imagery from Space, and improvements in multi-spectral and hyper-spectral imagery, with possible materiel solutions through a mobile processing platform (the MOPED) and a direct-downlink imagery platform (Eagle Vision II). Both are now in stages of combat development.

Our Space control program is also moving down the technology and combat development pathways through the benefits of excellent relationships formed with AFSPC and U.S. Space Command on defining our way ahead. Our Space Modernization Strategy pulls all these programs together into a coherent investment plan for the Army.

Most of you should be up to speed on the findings of the Space Commission and the Secretary of Defense's implementation of those findings. We have actively worked this implementation for more than a year, and are now in its final stages. It appears that the major impacts on the Army will be that the Air Force will be the executive agent for Space, with the exact responsibilities being defined now.

The Air Force will also be the acquisition executive for Space, which will impact on most of our Space pro-



An overview of Salt Lake City area with 3-D insert views. These views illustrate the potential use to Space Operations Officers for smaller areas of interest at higher resolution.

grams. In addition, the creation of a Space funding mechanism (the military funding program) along with the Undersecretary of the Air Force/Space becoming the Director of the National Reconnaissance Office (NRO) has allowed the nation's Space forces to begin to gain form and become a true "community." Finally, the National Security Space Architect is also under the Undersecretary of the Air Force/Space and has expanded responsibilities.

The Army is also increasing its leadership role in the Space community. One of the outcomes of the Space Force Management Analysis was a decision for an increased Army presence in the Space community.

This decision has led to the addition of four FA 40s in the NRO and the creation of an NRO-Army Coordination team. This team consists of two military intelligence officers, two FA 40s, one combat arms officer and one acquisition officer.

We are actively pursuing positions in various Air Force Space units, Space and Missile Command in Los Angeles, Joint Tactical Force-Department of Defense Manager Space at Patrick Air Force Base, and have increased our FA 40 positions on the Army Staff by several fold. At the flag level, currently both the Deputy Commander in Chief and the J5 in U.S. Space Command are soldiers; for the first time ever, a soldier has filled the position of Director, National Security Space Architect. Brig. Gen. Stephen Ferrell was recently appointed to this position, building upon his experience as the U.S. Space Command J5 and an Assistant Division Commander for 3rd Infantry Division. FDIC and the FA 40 proponent office will continue to pursue any opportunity to expand FA 40 presence in the Space community.

Whenever you are conducting Space operations and discover problems in Doctrine, Training, Leadership, Organization, Materiel, and Soldier issues, send an email, prepare an after action report, or just call FDIC either at our Colorado Springs or Washington, D.C. offices and let us know your observations. Our relationship to you is no different than the one you had with your schoolhouse at Fort Rucker, Fort Sill, Fort Bliss, Fort Huachuca, Fort Gordon, etc.

When you are deployed, conducting Space operations, and answering the tough questions of the operations officer or commander, never feel you are alone. Army Space Command is ready to support and to answer your immediate needs through reachback operations; FDIC is ready to make the long-term fixes to ensure improvements and progress in our mission accomplishments. "Fort Space" is ready to back you up.

Together we will "secure the high ground!"

'We're Part of Army Space'

National Guard Recognizes Space Mission Importance

Lt. Gen. Roger Schultz, Director Army National Guard

The union between U.S. Army Space Command and the U.S. Army National Guard took a solid step forward this year. With that step, the Colorado Army National Guard continues in the forefront. Fourteen soldiers from the 193d Space Battalion mobilized to active duty at Fort Carson in January. They joined nine other soldiers from the battalion who came onto active duty with U.S. Army Space Command in November.

As these newest soldiers prepared for their activation, Lt. Gen. Roger Schultz, Director of Army National Guard visited Army Space Command Headquarters in Colorado Springs. He sat down for an interview with the *Army Space Journal*. The following are his answers to our questions.

We know from your comments that you had a good visit today.

I'm most impressed with what's going on here.

You know, I have no doubt there's Space in the Army's future. There's a mission here. Think about that. We — the Army National Guard — are there in the Army's future.

For us, it's really exciting. I mean it's not the traditional "here's where we've been, here's what we've always done, here's the way we see things."

This, for us, is new and it's emerging and we're excited to be a part of it. This is a valid portion of our structure. I'm talking about allocating, dedicating a portion of our structure to this mission. We know that there will be some new emerging ideas, there will be some lessons to be learned and there will be some things we haven't anticipated — so there has to be some flex built into the concept of the operational model.

We're talking today about the Army in 2004, 2009 and I'm saying beyond that, what is our future, what's in the Guard's future and what's in the Army's future? What's going on with homeland security, missile defense, and missions around the world where maybe today the Guard's not present, but we could be?

You know our soldiers don't train full-time, they don't soldier full-time, and so we bring kind of a unique background, a unique example to some of these missions. Not just growing up in units, some active duty and some Guard type, but a civilian experience from the info-systems, info-ops world, day-to-day, civilian based kind of experience.

Where do you see the National Guard as a whole going in terms of Space?

The first thing I want to do is make certain that we fit the required missions that are developing. It's not just sending the Guard into Space missions because it sounds good. I'm into a deeper issue than that. I'm saying what does Space begin to require in terms of units, in terms of skills, in terms of capabilities.

We're going to design units to compliment that mission set. We're going to create, and we will design...everything I've talked about now is in concert with Army Space and SMDC requirements.

That's where the Guard's going to contribute, and so we'll grow the units over time. We'll grow the soldier skill over time; develop that skill obviously in concert with the Army's need for Space mission capability. That's how it's going to fit.

What we're talking about is Space having application for homeland as it does for theaters outside the continental U.S.

What's your major focus of how you see the whole Guard going?

It's not just continental U.S., it is missions around the world and where the Guard might contribute.

My point is, based on the missions now being better clarified — this is after the September 11 attacks — mis-

I had a sense there was potential here in terms of mission opportunity, but I also have a new appreciation for what goes on here in terms of the product, the outcome.

sions being clarified even more in the interest in our homeland, really our first priority in terms of military mission, the Guard will take on an active role.

We're going to be a part of it. That means in some cases standing shoulder to shoulder with our active counterparts, assuming the responsibility for leadership in ways that we perhaps have not traditionally thought of…I'm talking about Space.

Space has not been on our forefront for priorities in our past, even the recent past. We've talked about it some, but never really put units against those requirements and today we're developing those. I mean the unit, the design, the structure, the formation; we're developing those right now, in order to put together a unit.

You're saying Space is now a priority?

One of our priorities. It absolutely is and it's emerging, because it's developing new sets of reality here close to September 11. Now, we talked about Space before. We talked about creating units and that's where the 193d came from. The Battalion is of course very new in terms of its existence actually; it's virtually just a couple of months old. This is now an issue where we're going to move quicker than we had originally planned. That would be a part of our response.

One soldier told you he knew lives were at stake based on his work in Blue Force Tracking. This accentuated your point that you have Guardsmen doing very important tasks.

When a sergeant makes that comment, it brings home the significance of this mission and the reality. I'm talking now about the responsibility that individual soldiers have at a remote site many, many miles away contributing in significant ways to a theater commander who's making decisions of operational significance.

That's our role here. We assist that deployed theater commander and those units of soldiers performing their missions. That's also the key here. We all have a warfighting focus, whether it be here in homeland defense — a very different focus then what we're used to, or for a deployed theater.

I tell you this, not independently, we're part of a team here too. We're part of Army Space Command, we're part of this mission set. And we're going to move faster than we had originally planned in fielding some of these units.

By the way, it made you proud when you heard the sergeant say that.

Absolutely. If you went back just a year, someone would say "tell me again what the Guard is doing in Space?"

That discussion we had just a few minutes ago will give you a classic example of why we probably ought to move out with some of these concepts that we had talked about a few short months ago.

You know the Guard is unique. Guard soldiers are in every state and territory, we respond to Governors day to day for peacetime missions. But our federal mission is to support our nation's military strategy.

Do warfighters have a difficult time understanding the importance of Space?

When you talk warfighters, my sense is that we all don't understand the potential, and I'm talking now the application. This is the leverage; this is the power of technology. This is taking the contributions, the potential of this place, these units, and the missions and putting them to work. So, my sense is, it's really one of communicating the capabilities within Army Space. What are the capabilities here CINCSPACE, what are the capabilities for things that hadn't been thought of earlier?

(See Guard, page 36)

With the advent of the global positioning system (GPS), Army Tactical Exploitation of National Capabilities (TENCAP), and other Space-related functions, today's tactical warfighter has the demonstrated need for the integration of Space capabilities.

Space and the Interim Division

By Lt. Col. Thomas A. Gray

For years, Space has been within the realm of the strategic level of warfare. With the advent of the global positioning system (GPS), Army Tactical Exploitation of National Capabilities (TENCAP), and other Space-related functions, today's tactical warfighter has the demonstrated need for the integration of Space capabilities. The Army, in its pursuit of information dominance as a combat multiplier, recognizes the added value that Space provides to the tactical fight.

Space expertise currently resides within the different battlefield functional areas; however, that expertise is limited to the scope of the individual Battlefield Operating System. The need for a single resident expert to integrate Space into all operations the commander is responsible for resides with the Space Operations Officer. The tactical commander should be able to rely on one source for advice and information regarding the contributions of Space-based systems.

The Interim Division (IDIV) provides the Space community the first opportunity to build into the organization the systems and capabilities to enhance the commander's operations right from the beginning. The need to integrate Space capabilities and their related contributions to support the warfighter is inherently obvious; however, the articulated requirements are nebulous at best.

The compressed time for effective development of the IDIV design did not allow requirements documentation along conventional lines. With some historical reference to the abandoned Strike Force concept, the Space Support Element (SSE) was designed to provide Space Operations Officers to the main command post for planning and the tactical advanced command (TAC) command posts to effectively integrate Space capabilities into current operations. Primary support follows the Strike Force model to the G2, G3, G5, and the G6. Other staff interaction includes, but isn't limited to the targeting cell, G7, and support to the subordinate brigades for Space-based products.

Though a large part of the IDIV G2 resides at the Sustainment Cell, it is comprised of the analysts rather than the planners and executers of intelligence operations. The Space Operations Officers will provide necessary support to the G2 analysis via electronic connectivity as necessary.

Each element of the SSE at the TAC and Main command posts will maintain a vehicle and the equipment to achieve the connectivity necessary to provide the products and information the IDIV commander and staff require. Two majors and a specialist man the TAC command posts to effectively integrate Space products into the current operation. A lieutenant colonel, a major, and a sergeant operate in the main command post SSE to effectively integrate Space into the future plans of the IDIV. Satellite communications and classified Internet connectivity allows the Space Operation Officer to reach-back to the U.S. Space Command and Army Space Operations Centers for timely and critical information and coordination. Organic communications systems are the means to provide support within the IDIV command posts and to the subordinate units as necessary.

The IDIV draft organizational and operational concept includes the parameters for SSE conduct of operations. Staff work is underway for the completion of the IDIV operational architecture that defines the IDIV SSE functions, tasks, and information exchange requirements.

(See Interim Division, page 35)

We are writing the next generation of Army Space doctrine, confirming the lessons of the past, capturing the enduring principles of Army Space operations, and integrating the Space contribution into other Army operations.

Army Space Doctrine

Where the Past Meets the Future

By Ed Zehner

One principle that will not change in this era of Transformation is that "the Army runs on doctrine." Doctrine gives us the foundation of warfighting wisdom based both on historic experience and future expectations. It sheds light into the dusty corners of past conflicts, draws from those actions what worked and what did not, and keeps us from losing the lessons of our past.

At the same time, it provides a basis for projecting those lessons into future situations, assists our commanders in arriving at the right decisions, and details what is essentially the departure point from which soldiers can confidently engage in the full range of operations.

This is just as true in Space operations as in any other area of Army operations. We are writing the next generation of Army Space doctrine, confirming the lessons of the past, capturing the enduring principles of Army Space operations, and integrating the Space contribution into other Army operations.

The recent past has seen a significant increase in the recognition of the importance of Space to terrestrial operations. While it would be a mistake to insist that Space is at the center of the soldier's attention, neither can it be relegated to the periphery as an ancillary or optional function. From communications to navigation and timing to weather monitoring to intelligence, surveillance, and reconnaissance, Space plays a critical role.

Because these are so important to operational support, Space control must be exercised. We must have full access to the advantages of Space and be able to deny it to our adversaries.

The Army role here is its familiar, traditional one. Because land superiority is the Army's job, responsibility for terrestrial Space control dominance follows. The Army must control those areas in its domain that affect the success of land operations and it must contribute appropriately to the joint fight — Space control is part of that contribution.

Indeed, the Army is stepping up to this responsibility as service and joint roles in Space are clarified, missions are defined, and the Doctrine, Training, Leader Development, Organization, Materiel and Soldiers process is engaged for Space. To this end, we are refreshing Army Space doctrine in two upcoming documents. The first is FM 3-14, *Space Support to Army Operations*, which will replace FM 100-18. The second is FM 3-14.6, *Army Space Support to Corps and Divisions*. This doctrine is expected to be published in early 2003.

The Army continues to strengthen its ability to execute its core competencies and to transform toward the Objective Force by building its Space capability and fully integrating the unique and highly effective contributions of Space into the soldiers' fight. This doctrine will simultaneously confirm that commitment and provide to our warfighters around the globe the wisdom drawn from a successful past that can be recast for a future that will surely confirm the continuing superiority of United States Army land forces.

Ed Zehner supports the U.S. Army Space and Missile Defense Command Force Development and Integration Center in Colorado Springs, Colorado. He is a National War College and Air Force Institute of Technology graduate, and retired from the Air Force in 2001 after a tour on the Joint Staff. He commanded two launch squadrons at Vandenberg AFB, Calif., was a satellite operator at Falcon AFB, Colo., and a Minuteman III ICBM launch officer at F.E. Warren AFB, Wyo.

Spectral Operations Resource Center Support to the War Effort

"Two things we need are Enroute Mission Planning and Remote Sensing of the Battlefield."[1]

— General John N. Abrams, TRADOC Commander

By Bo Dunaway and Chuck Brice, Majors, U.S. Army, Retired

Just as the Army has charged Space Operations Officers "to focus and address Space-related matters pertaining to warfighting,"[2] in a paralleling effort, the Commander in Chief, U.S. Space Command approved and stood up a joint initiative, executed by Army Space Command, called the Spectral Operations Resource Center (SORC).

The SORC is a resource and part of the Space toolkit that Space Operations Officers and the Army's warfighters may draw upon for support. In performing its mission, the SORC works with the Naval Space Command (NAVSPACE), Air Force Space Command (AFSPC), Space Warfare Center (SWC), and 544th Intelligence Group (IG). This article highlights SORC capabilities, spectral products and processes, and datasets that can be "tapped" by Space Operations Officers for their supported warfighters.

SORC Mission and Organization

SORC missions include coordinating and managing U.S. Space Command multispectral imagery (MSI) and hyperspectral imagery (HSI) production capabilities; providing access to spectral (MSI, HSI, radar) information, products and services (primarily posted on the Army Space classified website[3]); advocating joint warfighter spectral information requirements; and integrating emerging intelligence and service community spectral capabilities into Space operations. The SORC is a joint spectral facility, executed by Army Space Command, with the U.S. Space Command Space Operations Center providing J2/3 oversight for tasking and leveraging U.S. Space Command component capabilities. SWC personnel and Army Space Command contractors and soldiers man the SORC, with plans for including NAVSPACE personnel and other joint agency personnel in the future.

The SORC also draws upon Army Space Command core capabilities such as the Mobile Processing Exploitation and Demonstration (MoPED). The MoPED serves as a platform for the SORC to use in joint exercises such as the recently completed Ocean Radiance Exercise in Tampa, Fla. Personnel and resources of the Army Space Command Remote Sensing Branch, along with the personnel from the SWC, the 544th IG and NAVSPACE Remote Sensing Information Center were integrated at the Ocean Radiance Exercise in October 2001. Most of these "spectral experts" are part of the larger SORC team in Colorado Springs.

Bo Dunaway, the SORC Director, and Chief, Army Space Command Remote Sensing Branch, explained that the SORC "is basically an entry point for G3/J3 users who don't have expertise to task, process, or plan spectral operations: the spectral have-nots." The SORC also serves to integrate U.S. Space Command capabilities with evolving measurement and signal intelligence/spectral architecture.

SORC Support to the War Effort

Since the terrorist attack of September 11, the SORC has been "tapped" by a wide range of users, including the V Corps Central Command, U.S. Southern Operations Command, the U.S. Air Force Surgeon General, the HQ 14th AF, 614th Standard Operating Procedures and others.

In the past months the SORC team made the first-ever, operational use of HSI to successfully validate high-priority targets for an in-theater warfighter. While

Mobile Processing Exploitation & Demonstration platform for the SORC

HSI imagery and techniques correctly identified what other means could not, it was the intelligence organization's in-country imagery analysts who then validated the locations reported through other means and sources. Neither the SORC nor HSI is a "stand-alone" targeting technology. Spectral technology has shown its value as another supporting tool for an all-source analysis confirmation of high-value targets.

Similarly, the SORC teams have demonstrated that spectral technology in the hands of geologists and imagery analysts can also be used successfully in a cross-disciplinary approach to support the war effort in-theater. Classified products can be viewed on the Army Space Command classified website.[4]

Contributions to Homeland Defense

The commander, U.S. Army Space and Missile Defense Command (SMDC) has had a role in the Homeland Defense effort to protect high-value, high-risk terrorist targets that include U.S. Space launches, nuclear and command and control sites in America, and high-visibility targets such as the 2002 Winter Olympics in Salt Lake City. Accordingly, the SORC, which encompasses and draws upon all the Army Space Command remote sensing capabilities, provided common operating picture products for various Army, Federal, and local agencies that were used in coordinating security plans for the Olympic venue sites in the Salt Lake City area. An overview product that provided broad area coverage of Salt Lake City environs, with 3D insert views, (represented on page 7) illustrates its potential use to Space Operations Officers for smaller areas of interest at higher resolution. Classified or for official use only spectral products and image maps are posted continuously at the National Imagery and Mapping Agency (NIMA) spectral imagery map site[5] or on the Army Space Command classified website. For example, 11 new NIMA coproduction maps were posted to this site in December 2001 along with their digital, print-ready files. Homeland Defense spectral support products have been provided to, among others, the Continental Army, Space and Missile Defense Command, and the U.S. Army National Simulation Center.

Other spectral products can include higher-resolution visibility and approach planning products in 2-D or 3-D as well as terrain categorizations and spectral analysis in MSI or HSI for determining what "belongs and doesn't belong" in a given location.

Current SORC Efforts

To continue to focus MSI, HSI, and radar cutting-edge techniques and capabilities on operational applications, the SORC concentrates on current essential elements of information from Central Command, European Command, Southern Command, and the Defense Intelligence Agency. NIMA coproduction of spectral information products has "shifted fires" from a largely Army focus to include sister service bases, training areas, and sites of interest for Homeland Defense mission planning. All of the products meet NIMA criteria for accuracy and format and are suitable for operational use. Much like NIMA, the Commercial Satellite Communication Initiative Management Office views the SORC as one of the most promising conduits for spreading operational use of measurement and signal intelligence to warfighters at all levels.

Conclusion

Periods of war have instigated leaps in applied technology such as widespread use of the global positioning system in Operation Desert Storm. In Operation Enduring Freedom, many cutting edge efforts will of necessity and with "Yankee ingenuity" be applied successfully, and these successes need to be passed among warfighters.

(See SORC, page 34)

2nd Space Operations Officer Course Graduates

By Capt. Laura Kenney

Feet planted firmly on the Army's traditional ground but eyes aimed with precision on the skies, 15 Army officers graduated in early March as fully trained Space Operations Officers. They belonged to only the second class of this elite new specialty to do so.

The seven-week course — which earns graduates Functional Area 40 — equips them with the tools and knowledge to provide future commanders guidance on conducting Space operations in support of the mission. Officers study orbitology, satellite communications, Space-based navigations and intelligence-gathering to include surveillance and negation of the same to opposing forces. The course is designed and instructed by the U.S. Army Space and Missile Defense Command's Force Development and Integration Center - West, located in Colorado Springs, Colo.

John Coons, Chief of the Training Branch, described the demanding course as 265 academic hours, 264 of which are classified. As a Vietnam veteran and retired commissioned officer, he was emphatic about the value of the training.

"This mission that we're doing here — training — is second only to the bedrock mission of any Army, that of actually waging war. As a young officer, I griped with everyone else about how much training we had to do — but I saw its immediate relevance the first time I was shot at. All of this fancy new equipment we have — and make no mistake, it's incredible — is worthless if they don't know how to use it. Our goal is to train a brand new corps of Space Officers, who will then go out into the field, learn even more, and come back to teach."

"This class benefited from all the lessons we learned with the first class, and they were also able to train on equipment that was not available to the groundbreaking first class. Both cadre and students gained an advantage from this, as they'll be able to take the lessons learned here and pass them with an even greater degree of sophistication to the next class starting in June," said Coons.

The course is divided into three segments beginning with 25 days of classroom instruction. Afterwards, a week is devoted to off-site visits to places such as the National Reconnaissance Office, the National Imagery and Mapping Agency in Washington D.C., the National Security Agency, and U.S. Army Space and Missile Defense Command Headquarters.

Included are hands-on training sessions with the Army Space Program Office, which develops Tactical Exploitation of National Capabilities Space support systems in use by Army warfighters. The course also includes a 43-hour command post exercise designed to test each student's proficiency in 24 individual critical tasks culminating in graduation and assignment to operational staff and Space systems program offices.

"This high level technology, with its at-times almost incredible capabilities, translates for me into a new way to support the soldier, the warfighter. I've been a logistics officer for a long time, providing beans and bullets to the troops. Now I'll be providing them with the very best of communication and reach-back abilities that are amazing," said course graduate Maj. Scott Parks of U.S. Space Command.

This group of Space officers, the first to graduate since the September 11 terrorist attacks that, in President George W. Bush's words, "shook but did not break the nation," feel strongly motivated by that tragedy. This emotional background added an even more intense layer of motivation to what was, for many, an already life-long fascination with Space and technology.

"This mission that we're doing here — training — is second only to the bedrock mission of any Army, that of actually waging war. As a young officer, I griped with everyone else about how much training we had to do — but I saw its immediate relevance the first time I was shot at. All of this fancy new equipment we have — and make no mistake, it's incredible — is worthless if they don't know how to use it. Our goal is to train a brand new corps of Space Officers, who will then go out into the field, learn even more, and come back to teach."

— John Coons, Chief of Training Branch, Force Development and Integration Center

"I've been a logistician for my entire Army career to date, but I've loved Space and anything involved with it probably since high school," said Col. Patricia Baxter, class leader and presently the Logistics Officer for Army Space Command. "When the opportunity arose to become a part of this new specialty, I jumped at it. It won't be quite the adrenaline rush of actually riding a rocket into Space, but it's the next best thing, and I'm proud to be part of something that will be serving the soldier, and the American public, as nobly as Space Operations will.

"I don't see another incident happening such as took place on September 11, because that was without precedent. Since it happened, the American people have become mobilized, not just the Armed Forces. No future hijacker is going to have an easy time of it, and our best defense is an aware citizenry. Witness how plane passengers took care of that would-be shoe bomber!

"Our job, in this new functional area of Space Operations, is to utilize the vast opportunities of Space, and all the technology that comes with it, to back up that first line of defense," finished Baxter firmly.

The tour of the damaged but in-construction Pentagon that took place during their visit to Defense Agencies, was encouraging for the Space Officers-in-training..

"Walking down the halls, you could see that all the children's notes expressing grief from across America were still up. That, plus the fact of re-building, sort of tells the whole story," said Maj. Eric Henderson, commander of the Army Space Support Company.

The speaker at the new Space officers' graduation, Brig. Gen. Richard V. Geraci, underscored the importance of Space to the Army in current and future operations. Geraci is the Deputy Commanding General for Operations, U.S. Army Space and Missile Defense Command, and Deputy Commanding General U.S. Army Space Command.

"This ceremony is about Army Transformation and your skills are vital to the development of the Army's objective force," Geraci told the graduates. "Your mission is to ensure that ground force commanders have access to Space-based capabilities."

Addressing the audience, he said:

"These officers will become some of the most critical players on a commander's staff, as will those who came before and those who will come after them," said Geraci.

"A colorful present-day example can be found in the ongoing operations in Afghanistan. We've seen U.S. Special Forces soldiers, riding into battle on horseback with our allies, carrying global positioning system receivers, satellite communications terminals, laser designators and laptop computers in their saddlebags."

Less graphic, but equally important, Geraci said there are other aspects of Space that have had a tremendous impact on current operations.

"The Army Space Command worked with national agencies to produce spectral imagery to help our warfighters on the ground," he said. "With our friendly force tracking capabilities, we can enhance our efforts to eradicate fratricide. We've also produced near real-time video that allows us to track movement on the ground, and our 3-D "fly-throughs" enable aviators and ground crews to "see" the terrain before they are there. And that's just scratching the surface of what we can do."

Geraci called the group of new Space officers "Space trailblazers."

"The Space Commission recently recommended

"In the Guard, you don't have the turn-over rate of an Active Duty unit. Most of our unit members are local, and there is a tremendous amount of civilian acquired skills present in our battalion. We have computer analysts, oribital specialists, even one man who worked on the Hubble Space Telescope. When someone with one of these top skills gets out of the Active Army, we snap them up, and keep their skills in the Guard, so they're still available to the American people. All but a few soldiers in my battalion have been mobilized for the current situation."

— Lt. Col. Michael Yowell, Commander,
193d Space Support Batallion,
Colorado Army National Guard

that each service develop a cadre of Space officers," he continued. "I'm proud to say the Army and the SMDC started the process long before that. Graduates will be spread thin, throughout various Defense Agencies and the warfighting commands. They will be the ones everyone comes to with questions about Space. They will be the ones speaking for the Army, which has a long history in Space.

"Recent events, starting with the Gulf War, and culminating in, most recently, our engagement in Afghanistan, have enlightened U.S. military commanders, and in fact the whole world, about the vast, largely untapped military potential of Space. Its importance cannot be over-emphasized."

Col. William Partridge, commander, Army Space Forces, presented each new Space Operations Officer with the distinguished Air Force Space and Missile Badge after Geraci awarded them their diplomas.

The badge, which retains its distinctive Air Force blue even on the Army green Battle Dress Uniform, displays the earth as viewed from Space, surrounded by stars and orbital paths, and features a central figure representing both an upward thrust into Space and the launch vehicles necessary for that movement.

The Distinguished Honor Graduate for the course was Maj. Gregory Bowen, a North Dakota National Guardsman assigned to Army Space Command on a three-year tour. Bowen achieved the highest academic score, with a grade point average of 99.1 percent.

"I've been interested in Space my whole life — what kid doesn't love rockets and gizmos? And Space is definitely the future for the Army. The course has given us a good foundation on which to build," said Bowen.

Four graduates hail from the National Guard.

One of those, Lt. Col. Michael Yowell, commander of the 193rd Space Battalion, a Colorado National Guard unit, commented on the strength that the Guard can bring to Space:

"In the Guard, you don't have the turn-over rate of an Active Duty unit. Most of our unit members are local, and there is a tremendous amount of civilian acquired skills present in our battalion. We have computer analysts, orbital specialists, even one man who worked on the Hubble Space Telescope. When someone with one of these top skills gets out of the Active Army, we snap them up, and keep their skills in the Guard, so they're still available to the American people. All but a few soldiers in my battalion have been mobilized for the current situation."

In the graduation address, Geraci emphasized the key roles that National Guard and Reserve soldiers, as well as Joint Forces, are playing in Space.

"Space-smart Army National Guard soldiers have been indispensable in performing current operations. Army Reserve soldiers with Space expertise have filled critical roles. Although the Army has an important role in Space, make no mistake, the 21st Century will see an increasing joint role, and a growing reliance on Space assets.

"The Objective Force paradigm — "see first, understand first, act first and finish decisively" — demands a continuously updated situational awareness distributed throughout the force. Space — and fine men and women like those you see before you today — will enable that to happen."

Upon completion of the course, students were assigned to various destinations to include U.S. Army Space Command, Space and Missile Defense Command, U.S. Space Command, U.S. Army Corps Headquarters, National Security Space Architect and National Reconnaissance Office, according to Force Development and Integration Center officials.

The next class is slated for June 2002.

Capt. Laura Kenney served five years Active Duty as an enlisted journalist with Air Defense Command in Germany. Later commissioned in the Reserves, she performed in Public Affairs in the Gulf War theater, and served as Deputy Public Affairs Officer for the American sector in Kosovo in 2001. She is presently mobilized in support of Operation Enduring Freedom, working in the Army Space Command Public Affairs Office.

Front row, left to right: Lt. Col. Michael Yowell, Colorado Army National Guard, Commander 193d Space Battalion, Maj. Gregory S. Bowen, North Dakota Army National Guard, Lt. Col. David W. Reese, FDIC-West, Maj. K. Jay Curry, I Corps, Brig. Gen. Richard V. Geraci, Col. Patricia A. Baxter, U.S. Army Space Command G4, Maj. Shelley L. Volkwein, U.S. Army Space Command, Maj. Joan E. Rousseau, U.S. Space Command. Back row, left to right: Maj. Matthew Nowak, Colorado Army National Guard, 193d Space Battalion, Maj. Ralph Trenary, Colorado Army National Guard,193d Space Battalion, Maj. Clay Scherer, FDIC-East, Maj. Eric Henderson, U.S. Army Space Command, Lt. Col. Timothy R. Tritch, U.S. Space Command, Maj. George A. Andary, U.S. Space Command, Maj. Gary Arnold, U.S. Space Command, Maj. Scott A. Parks, U.S. Space Command.

Top left: Brig. Gen. Richard V. Geraci briefs the students of the second Space Operations Officer Qualification Course.
Above: Lt. Col. Michael Yowell and Maj. Joan E. Rousseau, wargame during the final Command Post Exercise for the Space Operations Officer Qualification Course.
Left: Maj. Shelley Volkwein, Maj. Greg Bowen and Lt. Col. Timothy Tritch listen intently during the first day of the second Space Operations Officer Qualification Course.

Army Doctrine Captures Value of Space

Emerging Army Doctrine Captures Value of Space at Division and Corps Levels

By Stephen W. Brodersen

Since Desert Shield and Desert Storm, the Army has increasingly recognized the value and role of Space operations at the tactical level. This recognition is becoming an operational reality as the Army transforms its tactical forces and doctrine to meet the threat in today's contemporary operational environment. Space support of tactical operations is changing from what was essentially a liaison relationship to an embedded, doctrinally supported staff responsibility.

Army Space Operations Officers are currently assigned to each Legacy corps G3. As the Army continues its transformation, these highly skilled officers will establish Space Support Elements (SSEs) in the interim division and corps. The Interim Force SSEs are a bridge to the Objective Force and the Army is capturing this presence in its emerging Army doctrine.

The Combined Arms Doctrine Directorate at Fort Leavenworth is quietly and deliberately transforming Army doctrine. This new doctrine reinforces the value of Space operations by including Space and the role of the Space Operations Officer in four key doctrinal publications: Field Manual (FM) 7-15, *Army Universal Task List;* Army Training and Evaluation Program 100-15/71-100 Mission Training Program, *Corps/Division Command Group and Staff;* FM 5-0, *Army Planning and Orders Production*, and FM 6-0, *Command and Control.*

FM 7-15

FM 7-15, *Army Universal Task List*, is a comprehensive listing of Army tactical-level tasks and functions. It provides standard definitions and articulates what the Army does to accomplish missions.

FM 7-15, in its final draft form, contains two Space tasks. The first task — provide Space-based products and services — is linked to the intelligence battlefield operating system and focuses on enhancing the effectiveness of unit operations. The second task — provide Space support — is linked to the command and control battlefield operating system and supports tactical planning by using the military decision making process. These universal tasks establish Space support as a critical Army warfighting function and set the stage for establishing unit-specific Army Training and Evaluation Program Mission Training Programss.

Army Training and Evaluation Program 100-15/71-100 Mission Training Program

Army Training and Evaluation Program 100-15/71-100, *Corps and Division Command Group and Staff Mission Training Plan,* resembles the Army Universal Task List in that it is a comprehensive listing of the tasks, conditions, standards and performance measures associated with a division or corps headquarters. Key to the presentation of each task is the linkage to a specific staff element or section.

The Space Operations Officer and SSE are identified as contributors or points of coordination in numerous tasks in this important doctrinal publication. The integration and value added by the Space Operations Officer is captured in the performance measures of tasks associated with the G2, G3, and G6.

Two SSE specific tasks included in the Army Training and Evaluation Program Mission Training Program are to provide Space input to the military decision making process, and to provide Space-related products. These tasks detail the contributions of the SSE to the corps and division planning process and the conduct of current operations.

Army doctrine establishes the framework for military operations. As the Army transforms its organizations, it is also transforming the doctrine supporting its tactical-level tasks and functions.

FM 5-0

FM 5-0, *Army Planning and Orders Production* is the most recent doctrinal publication to enter the Combined Arms Doctrine Directorate's revision cycle. This FM is the Army's keystone manual for planning operations in peace and war. In its initial draft stage, the new FM addresses the traditional military decision making process as well as the emerging commander — centric decision — making techniques and automated decision support systems.

Similar to its predecessors, the new FM 5-0 contains examples of operational plans, orders, and the supporting annexes needed to complete Army tactical missions. For the first time in its history, however, this publication will contain a format and complete description of the contents of a Space annex. Space Operations Officers at all levels will use the Space annex to embed the added value of Space in the planning of military operations.

FM 6-0

FM 6-0, *Command and Control,* is the Army's newest contribution to the capstone doctrinal publications. Currently in its Doctrinal Review Advisory Group form, FM 6-0 completes the recognition of the value of Space support to the division and corps by capturing the role and responsibilities of the Space Operations Officer.

The Space Operations Officer is identified as one of the command's special staff officers. The G3 exercises coordinating staff responsibility for the Space Operation Officer; the Space Operation Officer, however, provides Space support and Space-based products to the entire staff. The specific responsibilities relate directly to the tasks outlined in the Army Universal Task List and the Army Training and Evaluation Program Mission Training Plan and include:

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Stephen Brodersen, Lt. Col., U.S. Army Retired, works with the U.S. Army Space and Missile Defense Command Liaison Officer to the Combined Arms Center.

The doctrinal foundation these four key publications establish will ensure our Army is space-enabled force capable of victory across the full

SPACE: A Military Far Frontier No More

By Lincoln P. Bloomfield, Jr. and Richard Hart Sinnreich

If recent reports are accurate, those who hold out hope that the militarization of Space can yet be avoided are doomed to disappointment. As Space platforms and the services they provide to U.S. military forces proliferate, Space is drawing closer to becoming a theater of war. The implications are as profound as they are unexpected.

Thanks to an innovative wargaming program sponsored by the U.S. Army, national security specialists in and out of government have experienced a taste of the world we may inhabit not long from now. This experience has yielded an early look at significant policy issues likely to arise from the growing integration of Space in U.S. military operations.

Riding the Technological Revolution

That Space has become an inescapable adjunct of military power is an empirical observation, not an ideological statement. During the past two decades, the military no less than society at large has become an avid consumer — and industry an equally avid producer of Space-enabled products from communications to intelligence. Military reliance on Space increasingly extends to commercial as well as government systems.

Expertise on Space capabilities is rapidly becoming embedded in military organizations at virtually every level of command. Today, involvement of Space experts in theater-level planning and operations is routine. Tomorrow, the interplay of Space systems with individual soldiers may be just as common. In Space, the Revolution in Military Affairs is already here.

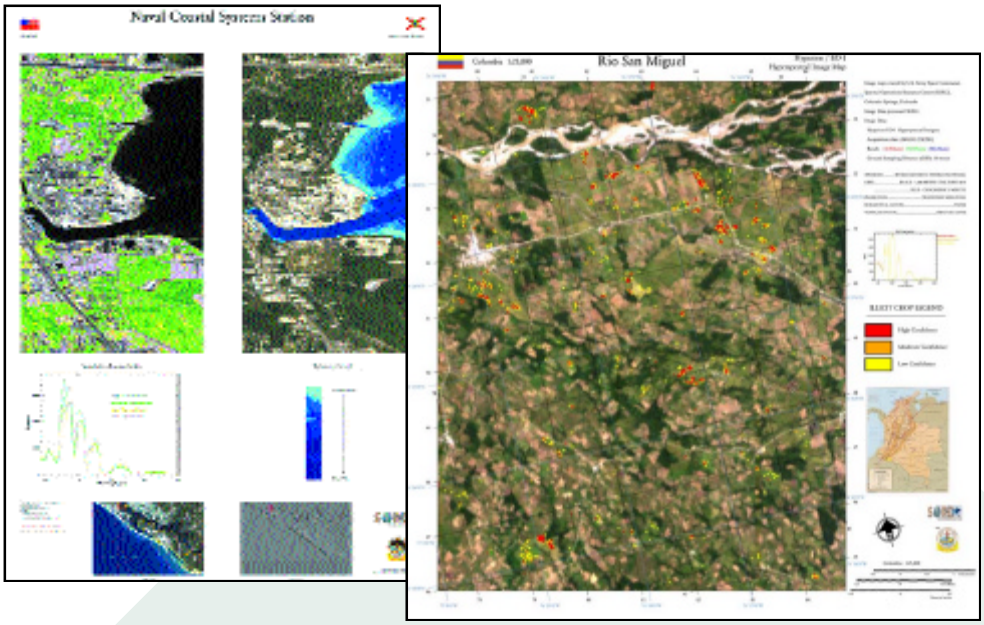
Our country's growing reliance on Space as an integral dimension of its military as well as its commercial strength poses profound policy challenges. Should Space-based communications and intelligence collection systems be defended? Should they be armed? Does the growing reliance on Space assets to achieve "information dominance" over an adversary suggest a potential need for preemption? And are crisis decision-making processes swift enough to respond successfully to threats to the peace in the Space "theater"?

Moreover, how grave a matter would we consider an attack on a U.S. satellite - as much an act of war as an act of aggression sited within U.S. Air, Land, Sea or Space? As grave as a strike against a U.S. vessel, aircraft, or facility where no persons were harmed? And how much certainty must U.S. leaders have about the apparent sudden loss of the use of one or more Space assets before determining that retaliatory action is justified?

Because questions such as these are central to our capacity to manage a future crisis on acceptable terms, they ought to be considered at the front end of the U.S. military's move into Space. From the perspective of military planners and arms controllers alike, the accelerating military reliance on Space marks a seminal change in the security environment. Already today, Space is host to global mobile telephony, beeper-based services, intercontinental bulk data transmission, multi-spectral imagery-assisted industry and agriculture, navigational tracking, and other information age services. Why should the military be expected to operate at any less a technological baseline than society at large?

On the contrary, the imperative of assuring reliable use of these capabilities in military contingencies will only intensify in the coming years as more capable orbiting systems are added to the world's commercial and governmental Space inventories. With the expanding ability to move information between continents, the military is availing itself of new efficiencies in much the same manner as sophisticated global commercial entities. All of which is to say that, even though no country yet has emplaced weapons in Space, the effective militarization of Space has already occurred, because Space is fundamental to our own military superiority.

Political efforts to keep the Space militarization 'cat' in the 'bag' or, failing that, 'walk it back' before some line of no return is crossed, have simply been bypassed by the natural evolution in civil-military Space utilization. Space defies any existing 'arms race' paradigm: here there is no



bag, no reverse gear on the cat, and no obvious line at which to halt the cat's forward movement even were it desirable.

Many will argue that the United States still can and, indeed must, refrain from deploying lethal weapons in Space to dissuade the rest of the world from doing so. Yet that is precisely the policy ideal we believe is already well on its way to being usurped by the inherent operational logic of the Space age.

Crisis Management: The Future is Now

In the wargaming setting, participants exposed to the advanced integration of Space-based and terrestrial military operations quickly discover that some of the military 'do's' and 'don'ts' perennially imposed by political leaders to control an escalating crisis may increasingly be impracticable, and that Space support of military operations therefore has burdensome implications for national-level crisis management.

In a future crisis, the president and senior advisors will likely be inclined to follow impulses honed by their predecessors over several decades of nuclear brinksmanship, such as:

- A desire to bound the conflict arena geographically;
- A concern over collateral civilian damage and effects;
- A preference for discrete and therefore more controllable escalatory steps;
- An aversion to military actions that might be particularly destabilizing if misperceived or misinterpreted; and
- A determination to keep strategic nuclear warning and communication capabilities visibly segregated from those associated with the military operations at hand.

The simulated future war environment suggests that all of these policy desiderata are much more elusive in the Space age. This environment reveals how suddenly a future adversary could place American satellites in its technological 'cross-hairs,' confronting U.S. field commanders with the prospect that these assets might be destroyed in seconds absent immediate counter-action. It highlights the challenge of judging, in that moment of uncertainty, whether and to what extent an adversary might expand its anti-Space operations beyond military to civil support systems. And it demonstrates the complexity of trying to preserve enough of an adversary's Space systems, in the midst of fast-paced escalation, to permit its leadership to make and implement war termination decisions without also preserving its continued capacity and will to fight on.

In short, while our nation's military forces reap major operational benefits from Space, one price is likely to be an acute sharpening of the dilemmas confronting our civilian leaders committed to retaining political control of military operations.

Pre-emption Problem

As the world's most extensive user of military Space resources and the most reliant on them, the United States would seem to have little incentive to initiate hostilities in Space. But as the likely military responder in a crisis rather than the aggressor, U.S. forces typically will be more vulnerable than their adversaries during the early stages of mobilization and deployment, and both information and information security will be precious. Hence, there will be immense pressure on U.S. decision-makers to deprive a potential adversary of Space-based information and communication capabilities before the latter can be used to target deploying U.S. and allied forces. Those pressures will increase in proportion to the expansion of potentially hostile non-U.S. Space capabilities.

Complicating matters is the likelihood that some of the capabilities used by an adversary very likely will be owned and operated by third parties such as multinational corporations, global private investment consortia, and nonbelligerent foreign governments. Attacking these assets would present legal and political problems not unlike those historically associated with naval blockades. Meanwhile, our own Space-based assets are likely to be

What seems beyond the art of the possible, however, is for future adversaries to consider U.S. Space systems something other than a fabulously lucrative target and a center of gravity for our high-tech military.

increasingly vulnerable to damage or destruction by an enemy whose familiarity with the contested ground makes him less sensitive to a mutual degradation of Space-based capabilities.

Put differently, access to Space systems will be more valuable to the United States than to its adversaries in a future conflict. A general degradation of Space capabilities on both sides will be expected to benefit the adversary. That prospect will only intensify pressures on U.S. commanders to deprive an enemy of the ability to interfere with friendly Space systems.

This pressure is all the more likely as Space platforms become more versatile. It has already become virtually impossible to distinguish platforms intended to support conventional theater operations from those supporting strategic nuclear systems. As single platforms increasingly host multiple critical military functions from command and control to lethal attack, an adversary cannot be expected to distinguish among them. And as threats to U.S. systems supporting theater operations become indistinguishable from perceived threats to our strategic defense systems, the incentive to pre-empt all such threats will increase. In turn, reciprocal pre-emptive pressures on a potential adversary will mount, all the more so if the latter also is a nuclear power.

Escalation Problem

Troublesome as these pre-emptive incentives are, they would be less dangerous were they limited to the Space platforms themselves. But it requires little imagination to forecast the emergence of surface weapons such as high-energy lasers or hypersonic missiles able to hit Space platforms from the Earth, and vice versa. Moreover, the ground-based support systems through which Space systems operate present technically less challenging and potentially more lucrative military targets than the platforms themselves. Blinding a satellite removes one eye from the sky; neutralizing the ground station controlling that satellite and others like it, whether by lethal or nonlethal means, impairs the entire system and may be easier to accomplish.

This surface-to-Space continuum increases escalation risks, since critical ground systems, whether friendly, hostile, or neutral, tend to reside in the owners' homelands or those of their security allies. At best, therefore, attacking ground-based Space assets would breach the threshold between theater and worldwide operations. At worst, it could foreclose any chance of localizing hostilities, the more so if the facilities attacked belonged to third parties. And if they belonged to a nuclear power, such attacks — however limited in scale and objective —could hardly be more destabilizing. That this concern merits careful study is abundantly illustrated by repeated recent wargame experience in which Space operations have produced rapid and uncontrolled conflict escalation.

Decision Problem

All this would place heavy burdens on leaders even in circumstances permitting both combatants to make measured decisions. But it is in the nature of Space capabilities that decisions concerning them will be among the first to confront policy-makers in a crisis. Except in the case of a surprise attack against forward-deployed U.S. forces, such as in South Korea, Space in the future is a good bet to be the first locus of engagement.

In this sense, Space hostilities depart from the classic Washington model of nuclear crisis management in which Western decision-makers assumed that both sides would use nuclear weapons only as a last resort. Thus, throughout the Cold War, U.S. and NATO military strategy sought to diminish the incentives for early nuclear use by either side.

The luxury of deferring a nuclear decision, however, relied on possession by both sides of assured second-strike capabilities. Hence, the emergence of potentially destabilizing capabilities such as accurate independently targetable and maneuverable reentry vehicles and heavy payload boosters offered major incentives to negotiate nuclear arms limitations. No corresponding incentive weighs in favor of limiting Space capabilities, particularly given America's commanding lead in such capabilities. Nor are current systems so robust or readily replaceable that the United States could with equanimity ride out a serious effort to degrade them in a crisis.

Unlike nuclear weapons, Space systems are active agents of tactical military effectiveness. And unlike nuclear weapons, they are capabilities of first rather than last resort. Even their ability to recover rapidly from attack would not overcome the immediate operational penalty resulting from their temporary loss or degradation. Hence, in contrast with nuclear weapons, recuperability of Space systems would not eliminate preemptive pressures. Rather, tomorrow's decision-makers can expect to be confronted with potentially escalatory

As with every new development in military technology, Space presents a familiar two-fold challenge: to reach for the future without losing one's grip on what is enduring in the conduct of war.

decisions in a radically compressed time frame.

Perhaps nothing is more ironic about emerging military Space developments than the very real prospect that systems once considered essential to dampening escalatory pressures may well instead become the most dangerous of escalation triggers.

Searching for Solutions

Since the trend toward military reliance on Space no longer seems reversible, if it ever was, we have an urgent obligation to assess how that reliance will affect geopolitics and military strategy, and how to minimize its adverse consequences. If possible, future U.S. Space-based capabilities should be made sufficiently robust to absorb attack without depriving our leaders and deployed forces of essential information in the early stages of a crisis, and thus without all-but-requiring preemptive action against threats to those systems.

It may also be desirable to reinforce escalation thresholds by restricting some clearly identifiable Space systems to strategic functions and encouraging other military Space users to do likewise. While thus far there has been little incentive to build self-defense capabilities into Space systems, such capabilities in the future may well be necessary to dampen pre-emptive temptations.

Meanwhile, operational planning should prejudge neither the availability of friendly Space capabilities nor the extent to which hostile capabilities will be subjected to attack. It follows that for every essential Space-based capability — and especially for communications, surveillance, and command and control — non-Space-based alternatives must be available on short notice to sustain continuity of operations. Our future soldiers must also be prepared to function in combat without the benefit of tactical information transmitted via Space.

Given the cost of developing and fielding Space systems, budgeting for robustness and redundancy is no trivial matter. Military Space systems are far too specialized to permit significant economies of scale. One obvious solution is for the military to continue to capitalize on the maturing commercial Space industry.

But relying on commercial platforms for wartime operations carries its own risks, not least the likelihood that doing so will result in both major economic disruptions and legal and diplomatic controversy at the most inopportune time. An adversary, it bears emphasizing, cannot be relied upon to distinguish between military and commercial platforms when both are operating to its detriment. Military employment of commercial Space systems thus has undesirable escalatory implications not unlike those already discussed with respect to theater and strategic Space support systems.

Finally, there is the practical problem of weighing the value of Space capabilities against conventional military capabilities. Today, Space systems are essentially enablers; their costs to some extent can be factored into those of the land, sea, and air systems that rely on them. That will change if and when Space platforms host lethal strike capabilities. At that point, it no longer will be possible to avoid direct cost and capability comparisons between Space systems and ground, sea, and air platforms achieving roughly comparable effects. We can also expect pressures to redefine the organizational relationship of Space capabilities to the military services; indeed, such pressures are already visible.

Comprehensive Policy Exam

While non-experts may fret about the risks of placing weapons in Space and the political consequences of being the first state to use them, the reality is that today's U.S. air, land, and sea-based attacks owe an important measure of their effectiveness to Space systems. We can try to develop weapons that will give future presidents alternatives to weaponizing Space and devise attack options that minimize escalation of a conflict.

What seems beyond the art of the possible, however, is for future adversaries to consider U.S. Space systems something other than a fabulously lucrative target and a center of gravity for our high-tech military. Having awakened in just the last few years to the implications of our military's growing dependence on this potent yet fragile domain of Space, defense planners have drawn the obvious conclusion that our military Space capabilities must not be left undefended.

(See Frontier, page 34)

Department of Defense's Need To Become a Responsible Commercial Customer

**By Lt. Col. Patrick H. Rayermann,
Chief, Space Operations at DISA**

One of the most important challenges facing the military and civilian leadership of the Department of Defense (DoD) today is how to put into effective practice the reliance DoD has placed upon the commercial Space industry. What often seems underappreciated is that, while the Department's leaders have consistently determined over the past decade to plan on filling a growing share of DoD's requirements for communications, imagery, and weather from commercial systems, the Department has not followed these decisions with the commitment and actions that will assure the availability of the commercial capabilities upon which it now relies.

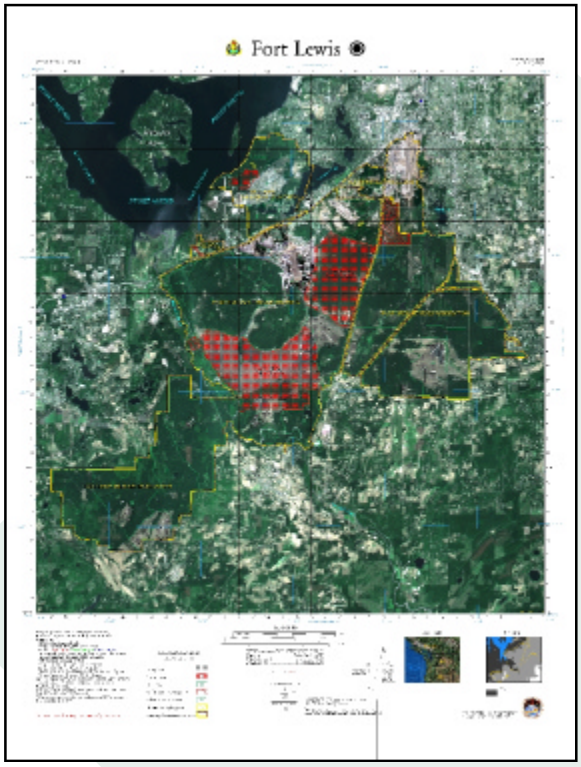
Although the degree of reliance on commercial capabilities varies for communications, imagery, and weather information, any of these areas can be viewed as qualitatively representing all three. [As the Chief, Defense Systems Information Agency Space Operations with responsibility for supervising the Commercial Satellite Command Service Office that is charged with providing wideband commercial satellite communications (SATCOM) to DoD (and other Government) users.] I am most familiar with how DoD's current practices constrain its ability to maximize the support it obtains from commercial SATCOM systems. This specific set of challenges is therefore what I will examine.

Commercial SATCOM and DoD Today

In 1997 the military's senior communications leaders met in a series of meetings at the Senior Warfighters' Forum. This forum reviewed current and projected DoD requirements for SATCOM and concluded that the projected military systems would be unable to keep pace with the projected growth in demand. Consistent with a 1993 Congressionally mandated initiative known as the "Commercial Satellite Communications Initiative," they chose to rely on commercial wideband (C, Ku, and Ka bands) satellite communications to augment the military systems to meet the Department's total SATCOM requirements.

What is not often discussed is that this decision was made from the perspective of total infrastructure: the Department's senior communicators looked at total demand and at total forecast military satellite communication (MILSATCOM) capabilities and directed that the difference between the two would be provided by commercial SATCOM systems. This decision committed DoD to make wideband commercial SATCOM a part of DoD's total communications infrastructure, also known today as the "Global Information Grid" or DoD's "Infostructure."[1,2] However, to date, the Department has not invested in the commercial portion of its SATCOM infrastructure on an infrastructure basis.

Instead, the Department relies on individual elements — in some cases down to the squadron or battalion level — to budget for and provide the funding necessary to lease the commercial SATCOM bandwidth those elements require. Additionally, the paradigm adopted by the Department means that users of commercial SATCOM are discouraged from entering into leases for periods of greater than one-year. Of the military services, the Navy has been the sole one to lease



A typical multi-spectral imagery product produced by Army Space Command.

commercial SATCOM on a broad, service-wide basis under its Challenge Athena program. Effectively, this means that the Department leases the commercial SATCOM it needs on a piecemeal, as-needed and as-can-be-funded basis. This is essentially a circuit-based approach; it certainly does not reflect an infrastructure-based approach.

The Problem

The result is a situation in which neither DoD nor the commercial SATCOM industry obtains from the other the maximum benefit. The commercial SATCOM industry operates on the basis of leasing at least 70 percent of its on-orbit capacity at any one time. Today, demand over most of the Earth is much greater: on a typical day, 95 to 98 percent of the capacity of the available on-orbit C- and Ku-band transponders is leased. For DoD customers, this means that finding the commercial SATCOM bandwidth they require, as and when they require it, can be difficult, untimely, and unaffordable.

The industry's leasing policy promotes long-term commitments. Leases typically are for five or more years and customers who know they have a long-term requirement often consummate 10- and 15-year leases. Reflecting this orientation, lease renewals are required six months in advance of the expiration of a lease. On 10-year leases, this poses a trivial amount of administrative overhead for both the satellite provider and the customer. For DoD customers with long-term (more than one-year) requirements, it means that three months after a lease period begins, they must begin working the processes within DoD to be able to renew their lease for another year.

SATCOM providers also structure their pricing to encourage/reward long-term commitments and compensate for capacity that has been lying unused by charging premium prices for it when short-term, low-bandwidth customers have a need to lease it. Savings on a 10-year lease versus a 1-year lease for a 36 MHz transponder are in the range of $800,000 per year — or around $8 million over the life of the lease! The net result is that, although DoD views commercial SATCOM as part of its global information infrastructure, its current investment approach to obtaining commercial SATCOM leaves it at risk of being unable to obtain the commercial capacity it requires and, in most cases, paying the greatest possible price for the bandwidth it can obtain.

The typical corporation with requirements for SATCOM charges its Chief Information Officer with "bundling" those requirements together into a total package and negotiating with satellite communications providers to obtain the best possible rate and the most favorable terms in exchange for a long-term commitment to lease an aggregate amount of SATCOM capacity. This may include in some cases, as with DoD, individual requirements that may be small (T1 or less) and spread across many portions of the globe.

Prescription for the Future

What the Department of Defense needs to do is adopt the same sort of approach as used by the large corporate consumers of commercial SATCOM.

(See DoD, page 35)

Space Operations Network (SONET)

Common questions of the Space Operations Officer

How do I conduct collaborative planning or coordination in real-time or near real-time with geographically disparate organizations?

Where can I find the latest information on Space-based systems or capabilities?

Who are the subject matter experts (SMEs) that can provide advice to me on this challenge or task?

How can I improve my visibility and criticality to the planning staff or command group?

Where can I find an example of a paper, briefing, Officer Professional Development/Non-Commissioned Officer Professional Development (OPD/NCOPD) lesson, or annex on which to base a product I'm creating?

By Lt. Col. Brad Baehr

If you have ever asked any of the above questions, the Space and Missile Defense Battle Lab (SMDBL) may have the answer for you. The SMDBL, in collaboration with the Center for Army Lessons Learned, designed a prototype web-based knowledge management system known as the Space Operations Network (SONET). SONET provides the Space Operations Officer with a knowledge management system focused on Space support to the Army. The purpose of this article is to acquaint you with the SONET, to explain how knowledge management systems work, and to solicit your participation as an active member of the SONET.

What is Knowledge Management (KM)?

Knowledge Management systems came into vogue in the early 1990's as businesses sought to gain the ever elusive advantage over competitors. Corporate America discovered that ingenious concepts and practices developed in one part of the corporation were not being shared in an effective or timely manner with other elements. In fact, the average time for a "best practice" to percolate through a corporation was 27 months![1]

Knowledge Management systems address the dilemma of having a vast treasure trove of knowledge held within the minds of the community without a way to access or share this knowledge.[2] Knowledge Management is a systematic approach to facilitate the exchange of knowledge, ideas, and best practices within an organization, what we refer to as tactics, techniques and procedures. For the purposes of this approach, knowledge is defined as processed information or information that has had some thought or analysis applied to it. It is important to note that Knowledge Management systems cannot work without the active participation of its members who are the source of the knowledge being managed.

How Does the SONET Knowledge Management System Work?

The SONET currently resides in the Lotus QuickPlace program, a commercial off-the-shelf Knowledge Management software program used by industry. You access the SONET through your web browser. All you need is a user identification and a password to access the full capabilities of the SONET. The SONET is organized into five major areas:

- The collaboration area supports real-time (synchronous) and near-real-time threaded (asynchronous) coordination and planning. Review of documents off-line or of products on-line can be conducted. Content and access to the collaboration area are controlled.
- The content center contains the Space reference library, briefing room, and classroom. This is where the latest information on Space is found. Briefings, lesson materials, lessons learned, student papers, and back copies of the Command and General Staff College Space newsletter are all here. The potential for pre-Space Operations Officers qualification course training and recurring training exists in this area.
- The knowledge base contains condensed elements of Space knowledge that are kernels of processed information which will become the heart of this system. Examples of these Space Operation Officer developed kernels are insights on Space play during division or corps warfighter exercises, perceptions from the field on the impact of new systems or capabilities, or other nuggets of processed information of interest to the Space community.

The SONET has the potential to support the operational warfighter by providing a collaborative planning and coordination environment, access to subject matter experts, and an extensive collection of Space-related training and reference materials.

All Army Space Operations Officers interested in exploring the advantages of this Space Knowledge Management system are invited to contact Lt. Col. Brad Baehr (brad.baehr@arspace.army.mil) for user ID and password to access the SONET. Please send any SONET questions or comments to the SONET site manager, Mike Doyle at mdoyle@arinc.com.

- The mentoring area provides access to Space and career subject matter experts. You can find advice on challenges and taskings, methods of improving your criticality to the planning staff or command group, and guidance on how to find "X" or accomplish "Y" in this area.
- The upload area is where members of the Space community submit their products for formatting and placement into the appropriate area of the SONET.

As discussed earlier, Knowledge Management systems such as the SONET require active participation of the Space community. It is the community that provides the knowledge, example products, as well as collaborative and subject matter experts support to other members of the Space community. While you are sure that the knowledge you need is out there somewhere, the trick is to find it quickly and efficiently. In a nutshell, the SONET Knowledge Management system is a single focal point for sharing Space information knowledge and conducting collaborative planning, coordination and support.

How Do I Reap the Benefits of the SONET Knowledge Management System?

This is the easy part. Just as you activate your email at the beginning of each business day, you could set the SONET as your Internet browser homepage and login each morning. With its embedded email and chat features, the SONET ensures that you are never far from true Space subject matter experts or from having your own expertise and experience tapped by other members of the Space community. You can download a condensed user's guide from the SONET homepage to learn the basic functions of the SONET.

As more members participate, the SONET will gain a life of its own with corresponding growth in value and utility. It is your tool, and will only work if you, as members of the Space community, make it work.

What Will I Find in the SONET Today?

SMDBL is conducting SONET beta testing by using a relatively small target audience with ongoing improvements to be based on this early testing. It is the SONET membership, however, that makes a Knowledge Management system work, provides most of the products, and all of the knowledge. The small test audience could not populate or use the SONET enough to assess its operational utility as a Space Knowledge Management system. Of the five major parts of the SONET discussed earlier, the library portion of the content center is the only area that has been filled to any significant degree. The classroom contains the unclassified Command and General Staff College Space lesson materials but does not yet contain the Funtional Area 40 qualification course material.

What Does the Future Hold for the SONET?

SMDBL is expanding the SONET into the operational Space community to evaluate its viability as a Space Knowledge Management system. A major part of this challenge includes making members of the Space community aware of the SONET and to solicit their active participation in sharing Space knowledge, products, tactics, techniques and procedures.

Transferring or mirroring the SONET from the Internet is the Secret Internet Protocol Network (SIPRNET) which is under consideration to improve the operational utility of the SONET. The SIPRNET offers many advantages as a host for the SONET.

The SONET has the potential to support the operational warfighter by providing a collaborative planning and coordination environment, access to subject matter experts, and an extensive collection of Space-related training and reference materials. SMDBL solicits your comments and suggestions on SONET structure and functionality, as well as your product input.

Lt. Col. Brad Baehr, U.S. Army, is currently serving as Chief, Concepts and Initiatives Division, Space Directorate, U.S. Army Space and Missile Defense Battle Lab, Colorado Springs, Colorado. He received a B.A. from the University of San Diego, California and is a graduate of the U.S. Army Command and General Staff College. He has served in various command and staff positions in the continental United States, Korea, and France, including commander, 1-12 Field Artillery, Fort Sill, Okla.; operations officer and project manager, Base Realignment and Closure Office, the Pentagon, Washington, DC; and special assistant to the Chief of Staff, U.S. Army, the Pentagon, Washington, DC.

Space-Based Reconnaissance

From a Strategic Past to a Tactical Future

We have limited ourselves to improving our strategic capabilities because, until recently, we have not had the technical ability to bring our Space-based assets to the tactical user. There are still many technical obstacles to overcome, but the idea of tactical Space-based reconnaissance is within reach.

By Maj. Robert A. Guerriero

Space-based reconnaissance is a cornerstone of the U.S. strategic intelligence capabilities. The United States has always been a pioneer in the area of Space-based reconnaissance, and today we are without peers. Our nation's reconnaissance satellites are some of the most sophisticated pieces of equipment that we produce. Most of our technical efforts to date have been directed toward improving our strategic reconnaissance capabilities. The soldier on the ground, however, needs tactical intelligence in order to be effective. Specific, timely, and accurate intelligence can give ground forces a decisive advantage on the battlefield.

While strategic reconnaissance is a great technological achievement, Space-based reconnaissance is still in its infancy. We have limited ourselves to improving our strategic capabilities because until recently we have not had the technical ability to bring our Space-based assets to the tactical user. There are still many technical obstacles to overcome, but the idea of tactical Space-based reconnaissance is within reach.

The National Reconnaissance Office is responsible for designing, building, and operating the nation's reconnaissance satellites. The office is divided into four directorates: Imagery Intelligence, Signals Intelligence, Communications, and Advanced Systems and Technology. The National Reconnaissance Office has also established an Operational Support Office to directly address tactical military concerns. It was not until 1992 that even the existence of the organization was publicly acknowledged; many of its activities and methods remain classified.

Our strategic intelligence capabilities did not come easily or without risk. The history of our strategic program begins with the Army Air Corps, the fledgling Air Force, and the newly formed Central Intelligence Agency (CIA).

The Birth of Strategic Reconnaissance

With the close of WWII and the detonation of atomic bombs over Japan, leaders in the United States realized that a new era was dawning. The World War II commander of U.S. Army Air Forces, General of the Army Henry H. Arnold, warned the Secretary of War that the country's leaders would require "continuous knowledge of potential enemies," including all facets of their "political, social, industrial, scientific, and military life" if they were to have advanced "warning of impending danger."[1]

Beginning in 1946, Army Air Forces conducted reconnaissance flights along the borders of the Soviet Union in order to determine the size, composition, and disposition of Soviet forces behind the Iron Curtain.[2] The intelligence collected from these missions was limited, since the aircraft only flew on the periphery of the Soviet Union and its satellite states. Some military leaders at the time recognized that if the United States were to prevent a future surprise attack by the Soviet Union, accurate intelligence was needed before hostilities began. The U.S. leadership determined that acquiring reliable intelligence about the economic and military activities and resources of a potential foreign adversary could only be accomplished through periodic high-altitude overflights in peacetime.[3]

The necessity of peacetime overflights was reinforced after a series of events stunned the United States between 1947 and 1950. A Communist-controlled government assumed power in Poland in 1947. A Communist coup in Prague ended that nation's independence in 1948, and the Soviet Union blockaded

While Space-based reconnaissance will always play a critical role in strategic reconnaissance, Space-based tactical reconnaissance is the new challenge.

Berlin later the same year. In 1949 the Soviets surprised the United States by detonating their own nuclear device. The United States was further shocked when the Chinese Communists swept to victory in 1949 and the North Koreans launched a surprise attack on South Korea in 1950.

In response to these world events, President Harry S. Truman authorized selected overflights of the Soviet Union in order to determine the status of its air forces. The concern was that the Soviets might launch a surprise aerial attack on the United States with long-range bombers. The new B-47B swept-wing bomber, built by Boeing, was selected to be modified and serve as the first U.S. high-altitude reconnaissance aircraft. The B-47B flew at altitudes of 41,000 feet and was capable of reaching speeds over 500 mph.[4] The first modified B-47B was flown to Fairbanks, Alaska, in preparation for its first overflight of Siberia. Just days before the B-47B was ordered to conduct its first mission, it burned on the ground in a refueling accident.

Two more B-47B bombers were eventually modified, and in 1952 one of these aircraft made the first deep-penetration U.S. overflight of Soviet territory to photograph bombers in Siberia (limited coastal overflights had been conducted by the Air Force and the Navy several months earlier[5]). This mission established the fact that the Soviets were not massing bombers in eastern Siberia. It served to set the important precedent that the President would approve overflights of sovereign nations when the security interests of the United States demanded it.[6]

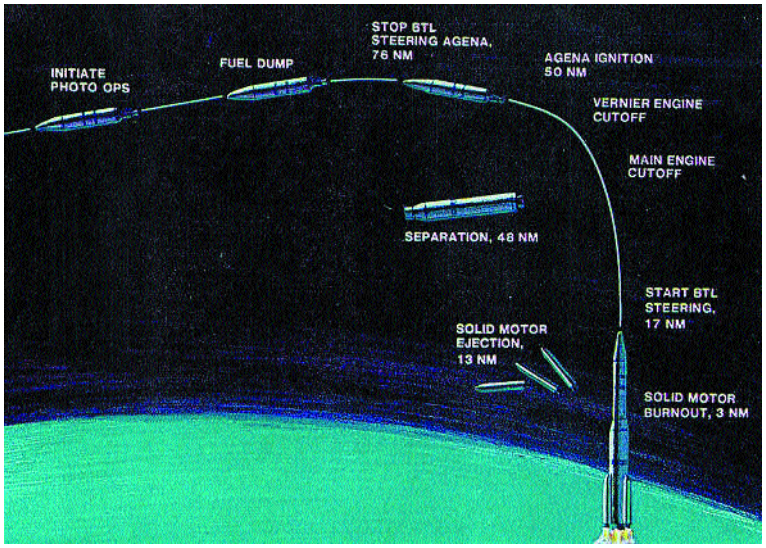
Overflights of the Soviet Union with the newly designated RB-47Es continued through 1954, often at great risk. Many of the flights were conducted in daylight and were routinely intercepted by Soviet MiGs. It became apparent that in order to fly strategic reconnaissance missions safely, a new aircraft was needed that could operate at altitudes well above any Soviet air defenses.

In November 1954, President Dwight D. Eisenhower approved a secret program under the direction of the CIA to build and fly a special-purpose high-altitude reconnaissance aircraft. Named Project AQUATONE, this program designed a fragile but sophisticated jet-powered aircraft that could fly above 70,000 feet and was nearly invisible to radar.[7] Lockheed was chosen to build the reconnaissance plane. In August 1955 the first "U-2" was test-flown in the Nevada desert.[8]

Other strategic reconnaissance missions continued as the U-2 tests were ongoing. In early 1956, Project GENETRIX consisted of high-altitude photoreconnaissance balloons that were intended to collect photographic intelligence as they drifted across the Soviet Union. They were designed to release their gondolas by parachute over the ocean and to be recovered in mid-air by cargo aircraft. In a span of about 4 weeks, 516 of these balloons were released from Turkey and Western Europe. The Soviet air defenses took a heavy toll on the balloons and their payloads, and only 44 gondolas were recovered.[9] Project HOMERUN was conducted between March and May 1956. During that time RB-47E reconnaissance aircraft flew almost daily flights over the North Pole to photograph and gather electronic intelligence over the entire northern section of the Soviet Union.[10]

On July 4th, 1956, the first U-2 flight over the Soviet Union took place. The U-2 did not live up to its expectations as a secret spy plane as the Soviets were able to detect and track the aircraft during the flight.[11] The Soviet leader, Nikita Khrushchev, sharply protested this overflight and feared that "when they understand that we are defenseless against an aerial attack, it will push the Americans to begin the war earlier." This led the Soviet Union to develop new air defense systems and to perfect an intercontinental ballistic missile.[12] President Eisenhower, however, was determined to continue the strategic overflights. Strategic overflight reconnaissance in peacetime became U.S. policy.

President Eisenhower and his advisors continued to develop the means and methods to gather strategic intelligence. Project OXCART advanced aerial over-



CORONA Launch Sequence (Photo courtesy National Reconnaissance Office)

The National Reconnaissance Office has played a crucial role in the development of Space reconnaissance systems that now span nearly the entire electromagnetic spectrum.

flight reconnaissance with the development of the SR-71, a supersonic aircraft capable of flying above 80,000 feet.[13] Aerial overflights soon moved out from under the military umbrella, and into the clandestine world of the CIA. Reconnaissance eventually left the atmosphere entirely and moved into Space in the form of satellite reconnaissance.

The CORONA Program

Since the early 1950s, the United States has recognized the potential of strategic reconnaissance to not only warn the nation of an impending surprise attack but also to provide the ability to verify arms-reduction and nuclear test-ban agreements. The idea of Space-based reconnaissance was attractive, because it possessed none of the dangers that aerial overflights did. In July of 1955, President Eisenhower announced plans to launch "small, unmanned, Earth circling satellites as part of the U.S. participation in the International Geophysical Year."[14] Eisenhower's underlying goal, never publicly stated, was to set a precedent by establishing the idea of "freedom of Space." Eisenhower's administration promoted the idea that all nations should have freedom of access to Space and that a nation could not claim a part of Space as an extension of their own airspace. This precedent is still adhered to almost 50 years later.

During the early days of the U-2 flights, the Air Force began studying ways to conduct satellite reconnaissance.[15] American leaders became even more convinced of the need for operational reconnaissance satellites when the Soviet Union successfully launched Sputnik-I on October 4, 1957. Early in 1958, the United States announced an experimental satellite program named Discoverer, which would orbit a series of benign scientific payloads. The entire Discoverer program, however, was an elaborate cover story for Project CORONA, the first U.S. photoreconnaissance satellite program.

The CORONA satellites were designed to be one-time use photography satellites, launched on a Thor intermediate-range ballistic missile with an Agena upper stage. The satellite consisted of a pod that mounted the camera and a recovery capsule into which the exposed film was fed. Lockheed was selected to have system engineering and technical direction responsibilities for the project. General Electric had the responsibility of developing the recovery capsule; Itek eventually won the contract to develop the sophisticated camera that would do the actual intelligence gathering. Itek promised to be able to resolve objects with dimensions of no more than 20 feet, stated as a ground resolution of 20 feet. Initially, 10 CORONA satellites and launch boosters were funded.[16]

Vandenberg Air Force Base was selected as the CORONA launch site. This was one of the few viable launch sites available for the program, since the photoreconnaissance mission required a near-polar orbit. Once the mission was over, the film canister in the recovery vehicle would be jettisoned back to Earth to be recovered over the ocean in mid-air by a C-119 aircraft. The capsule was also designed for a water recovery in the event that the mid-air capture failed. These air recovery techniques had been pioneered during the balloon reconnaissance days of Project GENETRIX. The recovery operation was too large to remain covert, so it was done openly with the explanation that capsule recovery was the only way to ensure the recovery of Discoverer data.

The CIA and the Air Force, who were jointly overseeing the CORONA Program, successfully argued to increase the number of launches to 12. They assumed that only one-third of the launches would be successful and at least four successful flights were required to provide coverage of the Soviet Union.[17] The early estimates turned out to be overly optimistic; CORONA's early days were not auspicious ones.

The first attempt to launch a CORONA satellite failed when some of the upper stage orientation rockets fired on the launch pad. This damaged the upper stage to such an extent that the rocket had to be removed and overhauled.[18] The second attempt, called Discoverer I and launched on February 28, 1959, successfully put a satellite into orbit. No recovery capsule was carried on this mission. The third attempt, Discoverer II, reached orbit, but the capsule was inadvertently released over Norway and never recovered. The next two launches failed to reach orbit. Discoverers V and VI reached orbit, but the cameras on both missions failed on-orbit. The next two

CORONA image of the Pentagon taken on Sept. 25, 1967. (Photo courtesy National Reconnaissance Office)

launches, Discoverers VII and VIII, were failures as well when the cameras malfunctioned again.[19]

The total number of authorized CORONA flights was now up to 20 in the optimistic hope that the system would eventually work as advertised.

Despite Lockheed, the Air Force, and the CIA scrutinizing the program after each failure, the failures continued. Discoverers IX and X never reached orbit (Discoverer X had to be destroyed over Vandenberg during launch). Discoverer XI experienced a recovery system malfunction, and Discoverer XII failed to achieve orbit.[20] Of the original twelve CORONA payloads that had been authorized, under the assumption that one-third of them would be successes, not one capsule had been recovered. The situation became grave for the United States on May 1, 1960, when Francis Gary Powers was shot down in his U-2 aircraft over the Soviet Union. President Eisenhower quickly ordered a stop to all strategic overflights.

Discoverer XIII, launched on August 10, 1960, as a diagnostic flight with no camera on board, successfully jettisoned its recovery capsule over the Pacific Ocean. Although the attempted aerial recovery failed, the capsule was safely recovered from the sea. After two years, there was hope that the CORONA Program might bear fruit. On August 18, 1960, Discoverer XIV was launched with a CORONA camera on board. The launch vehicle, satellite, and camera all performed flawlessly, and all 20 pounds of exposed film were successfully recovered in mid-air. After development, the 3,000 feet of film revealed 1,650,000 square miles of the Soviet Union that had been photographed at a ground resolution of about 35 feet. The Discoverer XIV mission alone produced more coverage of the Soviet Union than all U-2 missions combined.[21]

Improvements in the satellite and camera systems were made throughout the CORONA Program. Camera shutter speeds were improved and sharpened the images, while the ground resolution continued to improve until objects measuring less than five feet across could be resolved. Stereo cameras were used in most of the later CORONA missions to allow accurate mapping of the interior of the Soviet Union. Satellite vehicles evolved to the point where two film recovery systems were orbited on a single vehicle. This allowed the satellite to collect and return a series of pictures, and then lie dormant until another set of pictures was required.

The CORONA Program, although firmly established by 1963, still suffered occasional setbacks. A CORONA mission in March of 1964 failed when the film in the camera snapped. With the eventual failure of the power supply, the orbit decayed until the capsule reentered the atmosphere. Calculations of the impact point predicted that the capsule would splash into the ocean off the coast of South America. Several bright objects were seen in the sky over Venezuela on May 26, 1964, as the CORONA capsule returned to Earth. Two months later, the Air Force was shocked to learn that a Venezuelan farmer found the battered capsule in a remote rural area near the Colombian border. The capsule was clearly marked "United States." The CIA moved quickly to recover the capsule, but not before local farmers dismantled part of it for souvenirs.[22]

The CORONA Program continued until 1972 and became, despite its initial setbacks, one of the great early achievements of U.S. strategic reconnaissance. CORONA eventually involved 145 launches and covered a total of 750 million square nautical miles.[23] Using the CORONA intelligence, the United States had an unobstructed view behind the Iron Curtain.

National Reconnaissance Office

In 1961, President John F. Kennedy established the National Reconnaissance Program, which would consist of "all satellite and overflight reconnaissance projects whether overt or covert."[24] He also established the National Reconnaissance Office to oversee the program. The CORONA Program was transferred to its control along with the Navy's Gallactic Radiation and Background (GRAB) Satellite Program (GRAB was actually the first successful U.S. reconnaissance satellite, designed to collect signals intelligence of Soviet air-defense systems).

(See Reconnaissance page 36)

Advancement of the Space Tribe

Personnel Command Seeks to Assign "Right Officer to Right Job"

By Maj. John McDaniel

Hello from the Funtional Area 40 desk at the Army Personnel Command (PERSCOM)! As the Space Operations Career Manager and Assignment Officer, I want to share some useful information about your career, this functional area, and present and future opportunities in Space operations.

First let me say, I remain totally dedicated to the notion of placing the "right officer" in the "right job" at the "right time" and for the "right reason."

Population Statistics

Because Officer Personnel Management System XXI is working, the officer corps is closing in on achieving the condition known as "steady state." Since the last publication of this journal, our Army completed the career field designation (CFD) process for both 1975-79 and 1984-85 year group officers. With the addition of these officers, we have strengthened our Space forces considerably and provided many new opportunities for FA 40 officers.

Keep in mind that many of the newly designated Career Field 40 officers are currently not working in Space or Space related assignments (about 25 percent of the force). This is due to basic branch commitments. My daily battle rhythm includes efforts to realign the FA 40 force in an attempt to reach a condition of "full employment" in order to optimize the training, development, and utilization of our human resources.

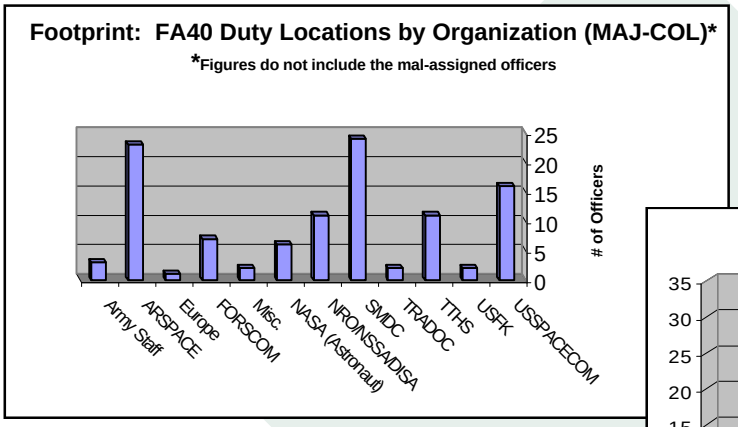
For the purposes of this article, full employment is defined as having 90 percent of the entire FA 40 population working in Space or Space-related assignments. The remaining 10 percent of the officers are either mal-assigned (because of a recent CFD) or, in a few cases, working in nominative assignments not related to Space operations.

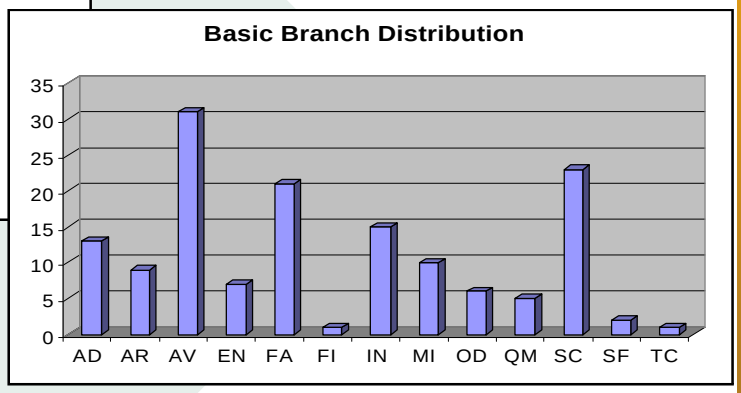
There are 14 colonels, 61 lieutenant colonels and 69 majors in FA 40. If this information were in the shape of a pyramid, its shape would be atypical if compared to force structure models.

The primary manning and authorization documents suggest an optimal pyramid ratio of 1 to 2.9 to 4.1 — colonel through major respectively. A "surplus" exists of about 20 lieutenant colonels, given the target ratios above. This surplus is due to recent accessions of the year groups 1975-79 and 1984-85 officers. Attrition resulting from retirements and promotion rates will "smooth" this anomaly.

In the past, I have suggested that thinking about the FA 40 population in terms of employment statistics may seem a bit strange, but it serves as a good yardstick to gauge whether or not we have truly optimized our force. The current employment rates for the entire FA 40 community shows 67 percent are in a Space related job, 25 percent are not, and eight percent fall into the training, transient, hospital and schools (TTHS) category.

TTHS is a natural occurrence that routinely accounts for approximately 6-to-7 percent of our Army's work force. Our current TTHS account stands at 8 percent, slightly above the Department of the Army average. When this figure (8 percent) is combined with the officers currently working in Space or Space-related assignments (67 percent), we conclude that 75 percent of our work force is properly employed. The remaining 25 percent of the FA 40 officer corps are currently working in other-than-Space operational assignments. This seemingly large percentage is due to the recent CFD additions to our population.





Basic Branch Distribution Statistics

The graph above (Basic Branch Distribution) depicts the current demographics of the entire FA 40 population. The FA 40 population is represented by a total of 13 different branches. The top three branches donating the largest density of officers are Aviation, Signal Corps, and Field Artillery. When these branches are combined, they constitute 52 percent of the entire population.

Advanced Civil Schooling

A look at advanced schooling shows that 65 percent of the FA 40 population have earned a post-graduate degree with one percent earning doctorates. Although obtaining an advanced degree is currently not a requirement for FA 40s, officers who do not have advanced degrees are strongly encouraged to pursue that objective.

Consider obtaining an advanced degree as part of your professional development and growth as an officer.

FA 40 Footprint

The graph above (Footprint) indicates how FA 40s are distributed throughout the Army and DoD community. Keep in mind that we are operating in a very fluid and dynamic environment. As Army and DoD missions change, often so do our requirements. Our proponent office is working with various DoD agencies in the re-coding effort; PERSCOM supports and augments that important mission.

Space operations are a boom industry; as our missions, roles, and objectives expand — expect and anticipate changes in force structure to occur as we pursue new targets of opportunity.

Next Assignment

I often field the question, "Which jobs are the best?" That is a difficult question to answer accurately. The facts are that it depends on whom you ask. Many of the Space operations jobs are relatively new. The best advice I can give you is simple: "Blossom where you're planted." I have heard senior leaders say words to the effect of "seek the hard jobs, do the right thing, and let the chips fall where they may."

I still think that is sage advice, no matter where you are, no matter what you are doing. There is an element of timing to the assignment process that is beyond any one person's control. I believe if you asked 10 different Space operators to identify the "top three" assignments by each grade plate, you would get 10 different answers. It is mission first, Space operators always!

Again, I would like to extend my sincere thanks to all the officers I have assigned and worked with during my tour at PERSCOM. To an officer, each of you have been extremely professional, courteous, and a pleasure to work with. Your sense of commitment and selfless service have been inspiring.

Your feedback and comments are of great interest to me. If you have any thoughts on future topics, areas of concern or interest, I would appreciate your input. I will do my best in addressing those areas in future publications. Seize the Ultimate High Ground!

Thank you for your time, energy, and service. For additional information, please visit my website at http://www-perscom.army.mil/opfamio/FA 40.htm or email me at john.mcdaniel@hoffman.army.mil.

SORC ... from Page 13

We are not selling spectral technology as a "magic bullet" for Space Operations Officers or other warfighters. As the Army's Space professionals, inside knowledge of these spectral successes and the ability to tap the SORC will help in the larger context to "normalize" Space while providing another reliable and responsive Space support tool for commanders at all levels.

The SORC can be tasked through the U.S. Space Command or Army Space Operations Center, and the Army Space Command G3.

Bo Dunaway is currently the Chief, Spectral Operations Resource Center and Remote Sensing Branch, G-3 Operations, Army Space Command at Colorado Springs, Colo. He served in the Army Space Command as the Chief, Remote Sensing Branch from 1998 until recently retiring from 24 years' active duty in the Army.
Chuck Brice has supported the Army Space Command's Remote Sensing Branch, G-3 Operations since 1993, following a 20-year career in the Army.

End notes

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DCG ... from Page 5

formerly known as National Missile Defense. After September 11, this cell expanded to plan a multi-tiered air defense structure using ground-based air defense assets to support homeland security. Army Space Command has worked extensively with NORAD to develop plans and potential options to support homeland defense. Operation Noble Eagle changed the dynamics of how we address air defense of the Nation. Army Air Defense soldiers from various commands, active, reserve, and National Guard, Department of the Army Civilians, and contractors have worked together to complete comprehensive studies and analysis on defending national assets, as well as to conduct exercises and demonstrations, to determine tactics, techniques, and procedures to protect critical assets. We are a part of the joint team working to protect North America with a seamless air and missile defense.

Since September 11, Space operations officers at all levels of command have been engaged in current operations to support the entire Army. This has been a particularly exciting time to be assigned to and supporting Army Space and Missile Defense Command. Our role across the full spectrum of military operations has been clearly recognized. We have been called upon like never before to provide services, products, and expertise at the strategic, as well as, operational and tactical levels. We have created new products, found ways of doing things better and faster, created tactics, techniques and procedures where none existed, identified areas of doctrine that need to be updated, gathered lessons learned, improved the integration of civilians and contractors into operations, mobilized Reserve Component Space officers and soldiers to man newly created elements and centers. We have met the warfighter's requests for support, products, and expertise without exception. Every member of this command and our Space operations officers stationed worldwide can be proud of the support we've provided in this global war.

FRONTIER ... from Page 23

As with every new development in military technology, Space presents a familiar two-fold challenge: to reach for the future without losing one's grip on what is enduring in the conduct of war. In the case of Space, the future promises unprecedented capabilities to acquire and communicate information, exert command and control, enhance the performance of surface and air systems, and ultimately expand the reach of military power. What endures is the reality that the ultimate test of military Space capabilities remains their impact on what transpires on the surface, for it is there that the political impact of military operations finally must be measured.

Space is already becoming a domain not unlike the high seas. However, in contrast to maritime usage, international law and custom relating to Space remain largely undeveloped. But that condition will not endure much longer. Whether we like it or not, because Space has become militarily significant, there is no going back. That it will be so exploited, by others as well as ourselves, is no longer in question.

Accordingly, the time has come for the United States to begin in earnest to define political guidelines for the military utilization of Space. Our great challenge is to manage the exploitation of technology's promise in a manner that preserves and reinforces the capacity of our democratic leaders to control a future crisis. By that measure we will know if our nation and the world are made more secure.

Lincoln P. Bloomfield, Jr. served as Principal Deputy Assistant Secretary of Defense for International Security Affairs, Deputy Assistant to the Vice President for National Security Affairs, and Deputy Assistant Secretary of State for Near Eastern Affairs in the Reagan and Bush Administrations. Richard Hart Sinnreich, a retired Army officer, is a former director of the Army's School of Advanced Military Studies and served on the Army, Joint, Supreme Headquarters Allied Powers Europe (SHAPE), and National Security Council staffs. Both authors have participated in recent Army seminars and wargames.

The Army After Next project, directed by the U.S. Army Training and Doctrine Command, which looked 15-25 years into the future and explored technological and operational concepts dramatically different from those of the present.

INTERIM DIVISION ... from Page 10

Each of these documents will contribute to the future understanding of how the SSE will "operationalize" Space in the tactical Army. The IDIV SSE is the foundation for the integration of Space operations at the tactical level.

There remain several questions that we as a community will need to answer with one voice. What does the tactical warfighter really need from the Space Operations Officer that he does not get from other members of his staff? What additional value does that officer provide? What can we use as a historical reference to articulate such officers' future contributions at the tactical level?

In the next issue we will look at how the tasks of the SSE will provide support to division operations.

Lt. Col. Thomas A. Gray is currently the Space and Missile Defense Command Liaison Officer to the U.S. Army Combined Arms Center at Fort Leavenworth, Kan. He served in the Army Space Command in the Army Theater Missile Defense Element Force Projection TOC and as the Executive Officer in the Space Directorate of the Space and Missile Defense Battle Lab.

Editorial Note. This is the second in a series of four columns that will outline Space in the Interim force. Following the first column that discussed the basics of the Interim Division, this column addresses Space within the tactical Army for Interim Division operations and design considerations.

DoD ... from Page 25

First, we need to help individual customer organizations throughout DoD understand the benefits that will accrue to all DoD customers if we collect all of DoD's commercial SATCOM requirements together and intelligently lease the capacity to meet the Department's aggregate demand. Second, we must change the paradigm in place today within DoD that causes customers to lease commercial SATCOM capacity on what is effectively a "circuit-by-circuit" basis; we must persuade the Department that, as an essential part of DoD's communications infrastructure, commercial SATCOM should be funded and acquired centrally and adequately to meet most of the Department's peacetime and a portion of its projected contingency SATCOM requirements. Third, we must also further change DoD's paradigm for leasing commercial SATCOM so that we can enter into the long-term leases of 10 years or more that prove we are a serious customer to industry and that yield the benefits of cost savings to the military — and the American taxpayers. We need to get the most bandwidth for the bucks spent! Fourth, we must help the Department realize that the commercial SATCOM portion of its global information infrastructure should be consumed ahead of the MILSATCOM portion.

Commercial systems are optimized to provide coverage where paying customers are located. Military systems are optimized to be able to rapidly and agilely provide support at any location on the Earth where crisis of some sort arises. By employing commercial systems to meet a substantial portion of its routine requirements — the kind of requirements ideally suited to relatively unprotected commercial systems — our military will have sufficient capacity available on its MILSATCOM systems to meet surge requirements in the event of a contingency. This "surge" capability will then exist on the systems that are designed to have the capability to support forces at any location on the planet-whether there is normally a paying customer community or not.

An additional benefit in proceeding in this manner is that if DoD organizes its requirements for commercial SATCOM into an aggregated whole, leases capacity from industry on this basis, and enters into long-term (10 or more years) leases, then the commercial SATCOM industry will begin to perceive DoD as a serious, major customer. Both will benefit: DoD will have positioned itself to meet more of its SATCOM infrastructure requirements easily, responsively and affordably; industry will be able to count on DoD as a customer and size its constellations and on-orbit capacity accordingly. This last point is important because there is a real possibility that over the next 10 years the demand for long-haul, wideband SATCOM may dramatically diminish.[3] If DoD is not a regular, reliable, significant customer of the SATCOM industry — one whose needs the industry routinely plans on meeting — DoD may find as the next decade begins that there is no suitable commercial SATCOM capacity to lease.

Lt. Col. Patrick Rayerman, U.S. Army Signal Corp, is currently the Chief of Space Operations at the Defense Information Services Agency.

Endnotes

1 Lt. Gen. Woodward in his MILSATCOM 2001 presentation

2 Lt. Gen. Raduege in his Spring 2001 DISA Customer Conference presentation

3 Col Anhalt in his presentations to the USAF Science Advisory Board "Summer 2001" Study and the Via Satellite's SATCOM 2001 Industry Conference

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GUARD ... from Page 9

It's more an issue of awareness?

I think so. It's not, clearly not, an issue of just being aware of what we're talking about right now. Space, it is a theater all its own.

It is different, whether it be missile defense or other missions that we now have ongoing. It spans a whole series of interests, even from a peacetime day-to-day application. We can use some of these capabilities in ways that clearly add emergency response, and so there's a spectrum of applications across the range of missions.

The key for us now is to communicate this to the commanders, those that can use these products. Once they have a sense for the real, we can talk about mission enhanced packages. It's kind of the tour I've had today spread throughout a larger audience. We probably have more work than we have short-term capability.

What have you gained from coming here today?

I had a general idea about some of the components, and capabilities, some of the details that our soldiers, our units would be a part of here, but it's actually broader in a technical sense than I had originally anticipated there. I had an idea of what went on in terms of general missions in Space units, in Space battalions, but there's a set of details here that I didn't fully appreciate. I now have a better understanding of the capability.

I had a sense there was potential here in terms of mission opportunity, but I also have a new appreciation for what goes on here in terms of the product, the outcome. An enhanced field commander's warfighting sense of how they might place. This is a value added piece. I could place some these products to their distinct advantage; no doubt about it. This is value added work that in a way, I hadn't anticipated when I got here.

So, that's your take away.

And you know, this is a team that works here. Guard soldiers, traditional members coming off the street from the business community across this country volunteering to help us out in time of need. When the mission is completed, then we go back and perform our normal duties in a peacetime setting. But today we've got an emergency on our hands, that changed the scenario for the foreseeable future. And Space has a big part to play in it — the National Guard will be right there!

RECONNAISSANCE ... from Page 31

For 40 years, the National Reconnaissance Office has revolutionized strategic reconnaissance. Film capsule recovery satellites have been replaced with near-real-time electro-optical imagers, and signals intelligence gatherers continue to push the limits of technology. The Office has played a crucial role in the development of Space reconnaissance systems that now span nearly the entire electromagnetic spectrum. Intelligence gathering is no longer limited to nuclear disarmament issues and the prevention of surprise attacks, but includes such efforts as monitoring international terrorists and drug cartels, monitoring the proliferation of weapons of mass destruction, and aiding in natural disaster relief.

Until the World War II era, tactical reconnaissance was all that was possible. As technology has evolved, so has our ability to conduct strategic reconnaissance. This evolution of reconnaissance is entering a new phase, in which the goal is to apply our formidable strategic capabilities to our tactical efforts. This will require the same focused effort, ingenuity, and perseverance that made our strategic program a success. While Space-based reconnaissance will always play a critical role in strategic reconnaissance, Space-based tactical reconnaissance is the new challenge.

Maj. Robert Guerriero graduated from the United States Military Academy in 1990 and was commissioned as an Armor officer. He is now a Space Operations Officer assigned to the National Reconnaissance Office's Advanced Systems and Technology Directorate.

End Notes

1 Gen H. H. Arnold, Third Report of the Commanding General of the Army Air Forces to the Secretary of War, USAAF, Nov. 12, 1945, pp. 65 and 67.
2 R. Cargill Hall, The Truth about Overflights, The Quarterly Journal of Military History, 1997, Vol. 9, No. 3, p. 26.
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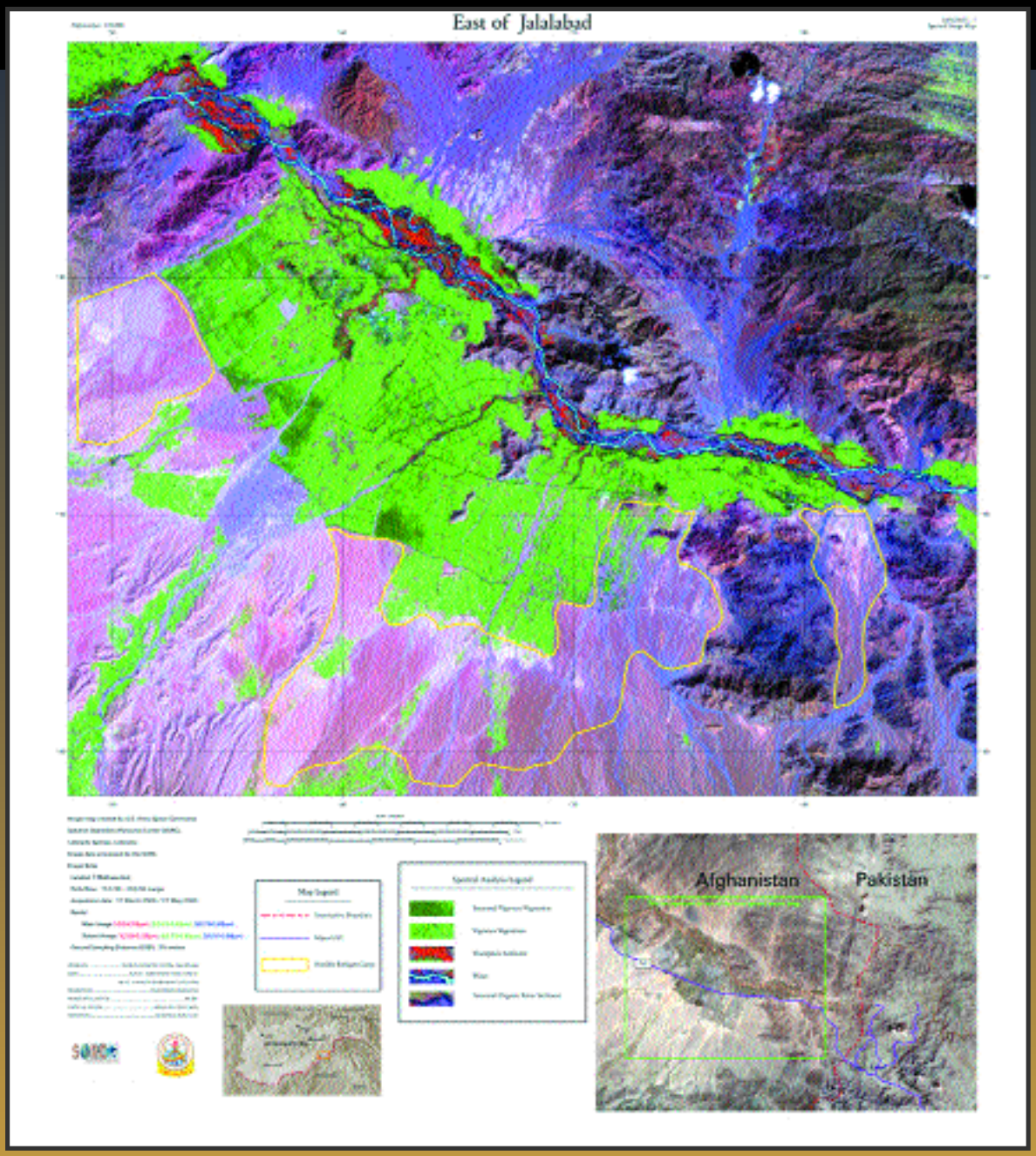
Spectral Imagery of Afghanistan produced by Army Space Command.
For more information on Spectral Capabilities, see article on page 12.



This is the leverage; this is the power of technology. This is taking the contributions, the potential of this place, these units, and the missions and putting them to work. So, my sense is, it's really one of communicating the capability.

— Lt. Gen. Roger Schultz
Director, Army National Guard

Since September 11, Space Operations Officers at all levels of command have been engaged in current operations to support the entire Army. This has been a particularly exciting time to be assigned to Space and Missile Defense Command.

— BG Richard V. Geraci

UPCOMING JOURNAL THEMES

Summer 2002 — "The Army's Role in Space Control"
Fall 2002 — "Space Operations — A Growing Industry"
Winter 2002 — "Transformation and Space Force Application"
Spring 2003 — "The Army's Future in Space"